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## The Imperial Railways of Japan

The Remarkable Thoroughness of the Japanese Illustrated by the Story of the Development of their Railway System

Travelers to the Far East have been wont to make extremely unpleasant comparisons between the comforts provided on the Imperial Japanese Railways and the discomforts discovered on the Chinese lines, and none who has had experience of the two systems will conscientiously assert that the comparison is unjustified. In Japan the Government is organized, in China it is not. Therein lies the fundamental reason for the lack of system on the Chinese railways. In Japan, too, railway control is free from political interference. It is a great organization in itself. In China any Tom, Dick or Harry of a tinpot General with a few thousand troops can defy the Ministry of Communications and set at naught their regulations. There are officials in China competent enough to put in an efficient railway organization, but they lack the force to maintain it against military interference. The Japanese Government on the other hand has placed the railways under a competent organization and has provided the machinery to enable those in control to enforce their decisions. Add to this the pride of country and achievement instilled into every Japanese and the efficiency developed is at once understandable. The Japanese feel that they can operate railways just as competently as anyone else, and, considering how they are handicapped by the original installation of a narrow gauge system, they do. It is to their great credit that they are now preparing at tremendous cost to sweep away the narrow gauge and replace it by a standard gauge system. This in itself is a task of Herculean proportions and it is faced without apprehensions or misgivings. In the operation of the system as it exists the greatest efforts are put forth to cater to the comfort of the traveling public and facilitate the transportation of freight. Maintenance of permanent way and equipment is of the highest order, and in this respect Japan can well challenge comparison. That the traveling public is so well cared for on a narrow gauge system speaks volumes for the capabilities of those in charge of the traffic, and travelers are always loud in their praise of the comforts afforded them. The work is thorough, and the history of the development of the system is a striking tribute to the reputation for national efficiency which the Japanese have earned.

### Inception of Railways in Japan

[By JAPANESE AUTHORITIES]

Japan's railway schemes date back to 1869, in which year the Government decided, upon the earnest endeavor of Prince Ito and Marquis Okuma, to undertake the construction of railway lines in the Empire. During March of the following year work was commenced on the railway line between Tokyo and Yokohama under the Chief Engineer Mr. Edmond Morrel, an Englishman, and on that between Osaka and Kobe in November. May, of

the year 1872, saw the opening to traffic of the Shinagawa-Yokohama section, the line being completed to Shimbashi in July. The opening of the railway between Tokyo and Yokohama was celebrated at the Shimbashi terminus, Tokyo (the present Shiodome goods station), in November in the presence of the Emperor Meiji. This was the inception of the present far-reaching railway system.

The Osaka-Kobe line was opened to traffic in May, 1874, and the Kyoto-Osaka line in February, 1877, the present trunk line known as the Tokaido Line thus gradually developing from both ends. Materials were supplied chiefly from England, and work progressed under foreign engineers.

Private railway enterprises were started in 1881 with the establishment of the Nippon Railway Company. This Company set to work on the line between Ueno (Tokyo) and Kumagaya under Government protection, and was opened to traffic in July, 1883. Both Government and private schemes made steady progress year by year, and, in May, 1887, the Government established the Private Railway Act to encourage private railway enterprises, endowing them with such privileges as expropriation and tax exemption of land for railway building, etc. This proved an immediate impetus to railway construction with private capital.

In 1888 the Sanyo Railway Company opened to traffic the Kobe-Himeji section, and in 1889 the Kyushu Railway Company opened the Hakata-Kurume section. Thus these private lines formed by degrees the present trunk line system comprising the North-Eastern, Tokaido, Sanyo, and Kyushu Lines. One company came into existence after another; the Kobu, Kwansai, Iyo, Ryomo, Sanuki, and Hokkaido Colliery Railway Companies were established. After 1887 the investment of private capital in various enterprises reached its zenith and at the end of 1899 private companies numbered more than 30.

This divergent ownership and management brought in its train lack of systematic working, etc., and the question of railway nationalization began to receive the serious attention of both the Government and the general public. At last, after years of investigation, the plan matured, and the Railway Nationalization Law was enacted in March, 1906, by which it was decided to turn over to Government ownership seventeen leading companies (Kobu, Hokkaido Colliery, Nippon, Gan-etsu, Nishinari, Sanyo, Kyushu, Hokkaido, Kyoto, Hokuetsu, Hankwaku, Sobi, Boso, Nanao, Tokushima, Kwansai, and Sangu). In the two years of 1906 and 1907, the Government bought the lines of all these companies, and the total Government lines on the completion of the railway nationalization extended to 4,371 miles, about three times their former length of 1,518 miles, while the invested capital grew from Y.170,000,000 to Y.700,000,000. Since then, the construction of the Government lines has been pushed steadily on, and even



FAÇADE OF NEW RAILWAY STATION AT TOKYO, WHICH HOUSES

comparatively remote districts are being provided with railway facilities.

At the end of 1915 the aggregate mileage of the Imperial Government Railways reached 5,759 miles, and the extension of lines since the nationalization had been 1,388 miles. Various kinds of railways under private ownership in Japan Proper at the end of November, 1915, were 2,829 miles in total length (railways—214 miles; light railways—1,404 miles; urban and other tramways—1,211 miles).

According to the latest returns, the total length of railways in Japan Proper, State-owned and private, was roughly 7,600 miles, of which 5,940 miles are owned by the Imperial Government Railways, and the aggregate mileage, including Chosen, Formosa, Karafuto, and South Manchuria, roughly 11,000 miles.

Thus, Japan's railway development has been steady and significant, and is all the more remarkable in view of the geographical nature of the islands. The capital invested up to March, 1914, was Y.967,001,763, and that up to March, 1915, is estimated at Y.1,010,284,563, and the annual net profit for one year ending April, 1915, was Y.54,564,532 while that down to April, 1916, is estimated at Y.60,089,087. The figures showing the rate of profit accruing from the railway working for the last decade are as follow:

1906-1907	8.7%	1911-1912	9.0%
1907-1908	8.5,,	1912-1913	8.9,,
1908-1909	7.6,,	1913-1914	8.4,,
1909-1910	7.6,,	1914-1915	7.3,,
1910-1911	8.1,,	1915-1916	8.2,,

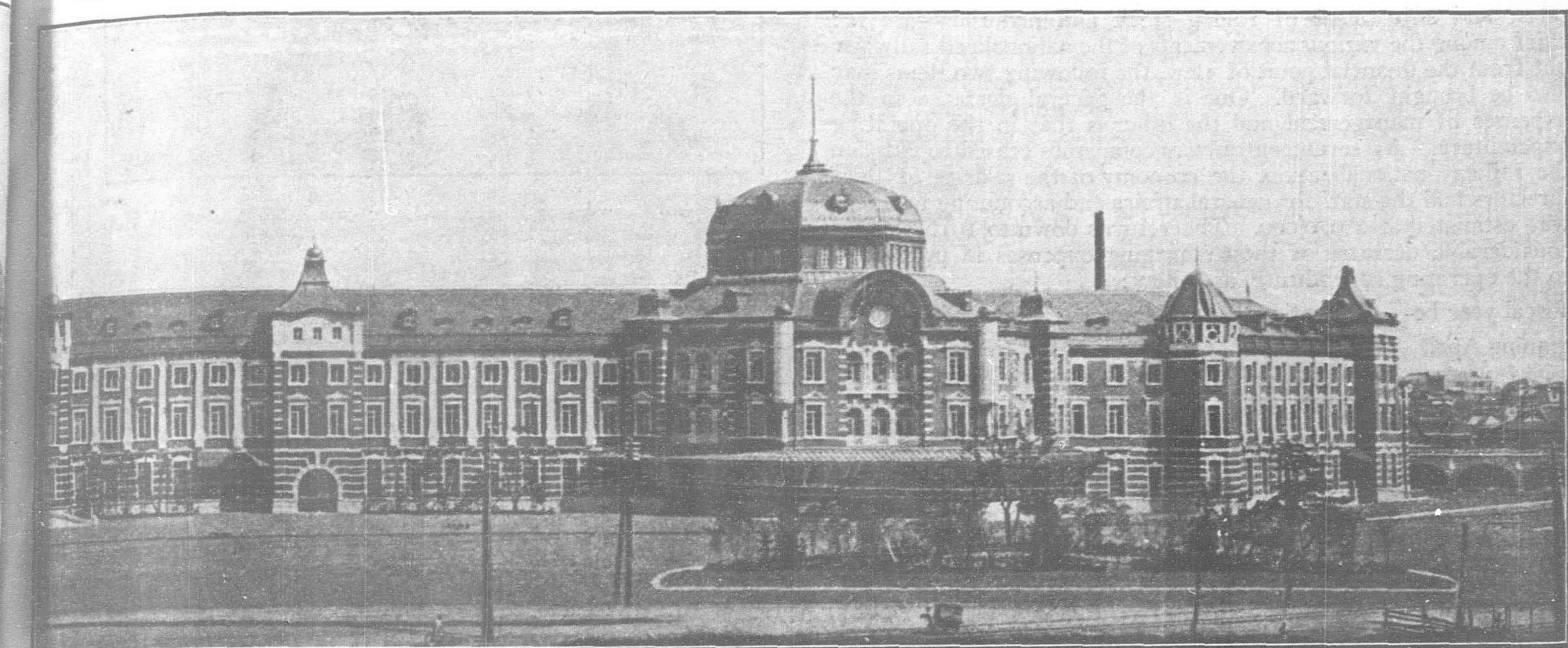
#### Railway Nationalization and Its Results

The merits resultant from the railway nationalization are manifold, and to explain the progress of the Government Railways more fully, we shall point to the principal achievements in detail. One of the chief aims of the railway nationalization scheme was the systematic working by means of through train services, unified passenger and goods tariffs, and simplified transactions and accountings, thereby increasing the efficiency of service, and simultaneously the revenues accruing from it. Train operations have been completely systematized on all the main and branch lines, especially on the trunk lines between Tokyo and Kagoshima, and between Ueno (Tokyo) and Kushiro. Passenger fares which had been on varied bases peculiar to each company before the nationalization, were unified by adjusting traffic mileage and revising the scale on and after November 1, 1907, on the completion of the purchase of the private lines in October of that year. In this revision all passenger rates in force on the former Government and private lines were taken into consideration

and the new tariff was laid down on the tapering system (cheaper rates for longer journeys), with a view to the reduction of imposts in general. Although some steps had been taken to revise goods rates on the Government lines except in Kyushu, consideration of local conditions and competition prevented the thorough unifying of the goods tariffs and the nationalized railways continued to be on different bases formerly adopted by each company. The goods tariff was chiefly local and highly differential, but at last was thoroughly revised in October, 1912, and placed on an equal basis on almost all the Government lines. To sum up the whole scheme, the tariff was generally made cheaper (especially for such staple goods as coal, minerals, fish, silk cocoons, etc.), and almost uniform on the Barème Belge with flat rates instead of the former Barème à paliers; terminal charges were included in freights and their rates lowered for short hauls; the calculation of freights simplified; first, second, and third classes applied to car-load consignments (formerly grouped in two classes, high class and below third class), in order to be fair to all kinds of shippers; the fifty "kin" unit was replaced by the ten "kin" unit for piece consignments according to "kin" rates; overland freights were calculated through when the goods were conveyed by the channel steamers; and extra rates for valuable goods and animals were greatly reduced. Both passenger fares and goods rates are reckoned through, not separately on different sections, as was the case prior to the nationalization. This undoubtedly has contributed not a little to the increase of efficiency of the passenger and goods service. The statistics showing the progress of passenger miles and ton miles are as follow:

Fiscal year beginning	Passenger miles	Ton miles
April		
1906	2,294,882,361	1,426,969,053
1907	2,621,434,819	1,545,991,639
1908	2,743,203,558	1,829,429,158
1909	2,812,329,108	1,911,197,440
1910	3,038,736,966	2,126,834,473
1911	3,382,586,411	2,347,871,475
1912	3,626,316,499	2,691,464,174
1913	3,690,964,619	3,053,852,638
1914	3,623,743,236	2,982,798,482
1915	3,856,536,966	3,309,518,677
1916	4,255,374,717	4,179,134,660

The most significant result of the unification of the passenger and goods tariffs was the general reduction in fares and rates on account of cheaper rates for longer journeys and hauls. The cheapness of fares and rates results naturally in stimulating productive industries and is effectual in multiplying the national wealth. The figures showing this tendency follow.



ALL CENTRAL OFFICES OF THE JAPANESE GOVERNMENT RAILWAY

Cheaper passenger fares are chiefly due to the increase of long distance travelers, season and commutation ticket holders, etc. As for the goods rates, they had gradually fallen along with the development of longer hauls down to 1912, in which year the receipts fell off more than 10% again owing to the revision of the goods tariff. There are reasons to believe that this cheap conveyance directly and indirectly goes far towards helping the industrial activities of Japan and the corresponding increase in the national wealth.

Fiscal year beginning	Passenger fares per passenger mile	Goods rates per ton mile
April		
1906	Yen .0155	Yen .0199
1907	.0149	.0203
1908	.0142	.0194
1909	.0140	.0193
1910	.0139	.0191
1911	.0139	.0194
1912	.0138	.0183
1913*	.0139	.0174
1914	.0138	.0172
1915	.0132	.0171
1916	.0134	.0166

Furthermore, these cheap fares and rates are levied for shorter journeys and hauls than those on foreign railways. The average journey per passenger is 21.6 miles, and the average haul per ton is 99.3 miles according to the returns for the fiscal year beginning April, 1916. When these conditions are taken into consideration, our railway fares and rates may be considered exceptionally cheap.

The railway nationalization was also effective in adjusting differences that had existed in the types of rolling stock and various materials, making one type common to all the lines and beneficial for working. Passenger cars have been improved by degrees; second-class sleeping cars were inaugurated, cushions in third-class cars made better, the highest standard of accommodation being reached by the Tokyo-Shimonoseki Train-de-Luxe, etc. Besides, the use of larger types of passenger cars has made the average seating space much more roomy, and warming apparatuses have been installed as widely as possible. These improvements have enabled the Government Railways to warrant the comfort, if not luxury, of accommodation, and encourage tours and travel at large, which results ultimately in the provision of further facilities for traveling. As for goods wagons, the improvement of axles has increased the loading capacity of these wagons, and those now built are chiefly 15 tons in capacity. Those cars with which faults had been found, such as damaged axles, imperfect construction, etc., have been replaced by new

and more solid wagons. Thus the loading capacity has grown year by year, as follow:

Fiscal year beginning	Average loading capacity per goods wagon (tons).
April	
1906	7.1
1907	7.2
1908	7.2
1909	7.3
1910	7.4
1911	7.7
1912	8.2
1913	8.6
1914	8.9
1915	9.4
1916	9.8

More powerful locomotives have been put into use by degrees and especially since 1911 superheater locomotives have been generally run with great economy. The use of heavy locomotives with increased traction power has necessitated the corresponding improvement of tracks for bearing heavy loads. No doubt heavy locomotives and better tracks mean much for the general efficiency of railway traffic. Also the tractive capacity of various locomotives has been systematized to the great convenience of transportation, and the annual increase in the average number of cars and the average load per train has been remarkable.

Fiscal year beginning	Average number of cars per train	Average load per train (tons)
April		
1907	20.4	71.0
1908	21.8	76.9
1909	24.3	90.3
1910	25.4	96.3
1911	24.6	95.1
1912	24.3	98.8
1913	25.1	103.9
1914	25.6	106.7
1915	27.1	115.5
1916	28.1	128.0

Besides, refrigerator cars are now run for the conveyance of fresh fish and meat, etc. October, 1911, saw the transport of goods wagons between Shimonoseki and Moji for their through operation between the Main Island and Kyushu, and the damage incidental to the former method of transhipment was entirely got rid of, making possible the through conveyance of bulky and heavy goods and coal, and marking a period in the local traffic conditions. These three results—systematic working, reduced

rates, and adjustment of rolling stock and materials—are the chief among the various achievements of the nationalized railways, but from the financial point of view, the following two items may also be brought forward. One is the general decrease in the expenses of management and the other is that in the operating expenditure. As seventeen railway companies ceased to exist on the railway nationalization, the economy of the salaries of their directors and the staff for general affairs and accounting business, was estimated at Y.970,000. The returns down to 1916 show a considerable decrease of these managing expenses in proportion to the operating expenditure, as follow:

Fiscal year beginning April	Operating expenditure	Managing expenditure	Ratio of the latter to the former
1906	Y.33,809,927	Y.2,379,078	.069
1907	37,989,259	1,124,902	.030
1908	41,096,073	1,078,869	.026
1909	40,824,988	969,509	.024
1910	41,868,250	1,161,527	.028
1911	44,251,827	1,311,760	.030
1912	48,395,753	1,456,400	.030
1913	52,172,161	1,360,415	.026
1914	55,360,979	1,369,091	.025
1915	53,802,030	1,181,101	.022
1916	61,163,450	1,310,855	.021

At the beginning of the nationalization, an economy of the operating expenditure was expected from the avoidance of clearing business among various railways for through traffic. Although the sum to be thus economized was then estimated at Y.170,000, no statistics are available to prove this, but still there is much evidence to testify that it has been the case.

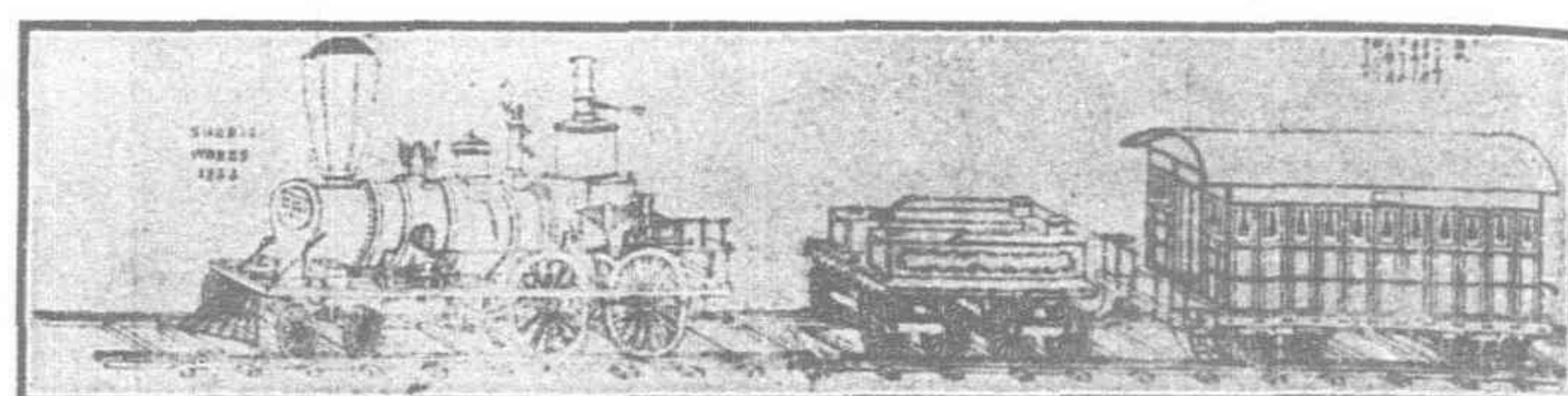
Also in the financial arrangement of the State, the Government Railways are now set apart as a special account, and all disbursements for construction, working, improvement, etc., are to be met by the receipts and profit accruing from railway traffic.

Last but not least, another feature of the railway nationalization is the efficiency of transportation due to the unobstructed circulation of the rolling stock on all the lines according to traffic conditions and the relative reduction of spare cars and wagons. This increase of efficiency was primarily estimated at 10 or 20%. Thus, goods wagons, except those of special types, have been made common to all the lines in the Main Island, and since the opening of the wagon ferry on the Moji-Shimonoseki channel, Kyushu has been included in the sphere of circulation of goods wagons. The haul of empty wagons, which had been of very frequent necessity prior to the nationalization, practically became unnecessary, and as this naturally produces a surplus of transportation capacity, the circulation of rolling stock among several lines leaves almost nothing to be desired. At the same time car repairs can now be readily effected in consideration of the quantity of traffic. As no statistics are available before the nationalization, we cannot give evidence of this fact by means of figures.

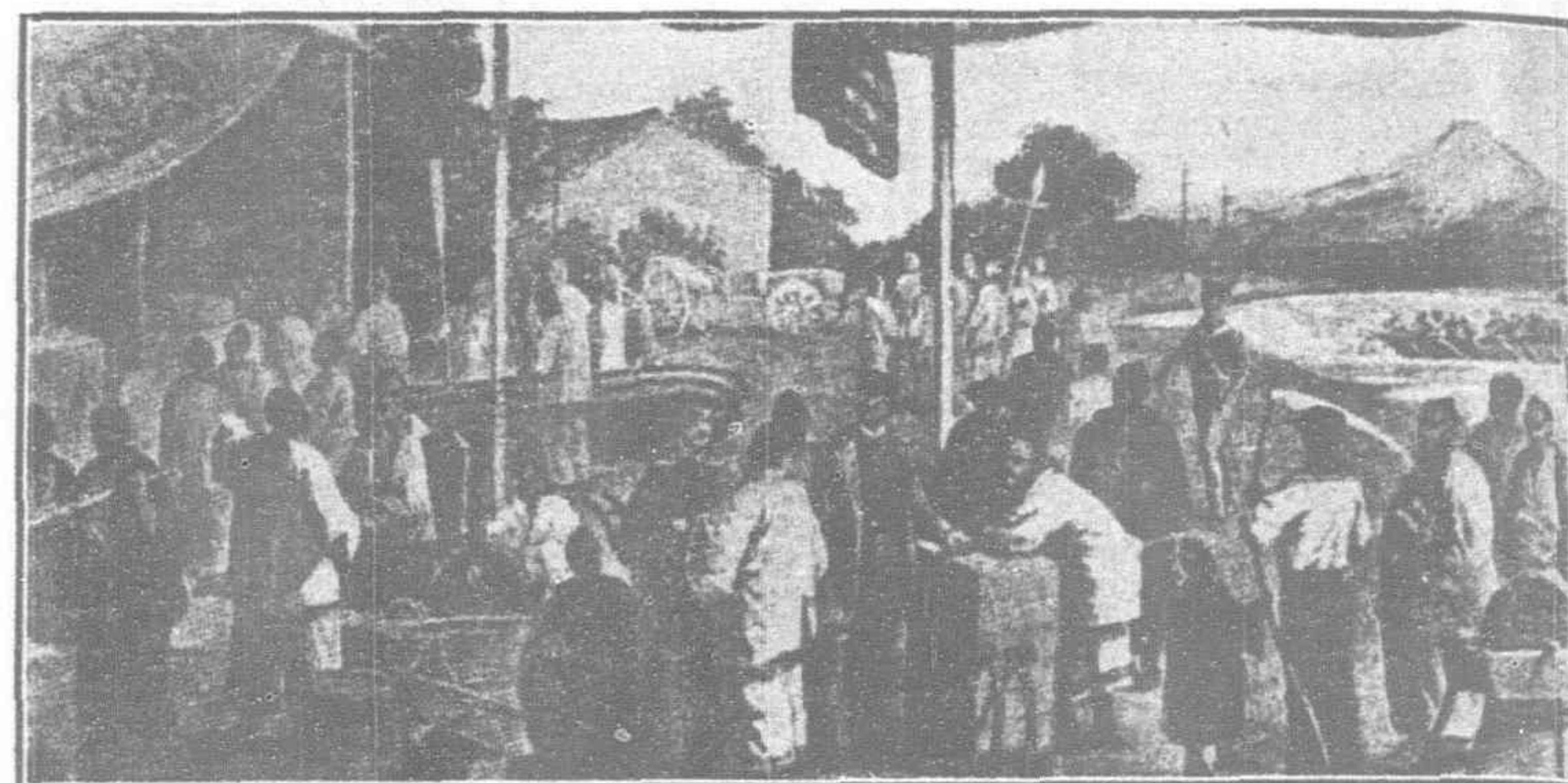
### New Departures Since Railway Nationalization

Since the railway nationalization the Government railways have made a point of adjusting different systems and institutions, as detailed above, and also left no stone unturned to introduce necessary new arrangements for the working of railway traffic. Some of these new departures are given in the following paragraphs.

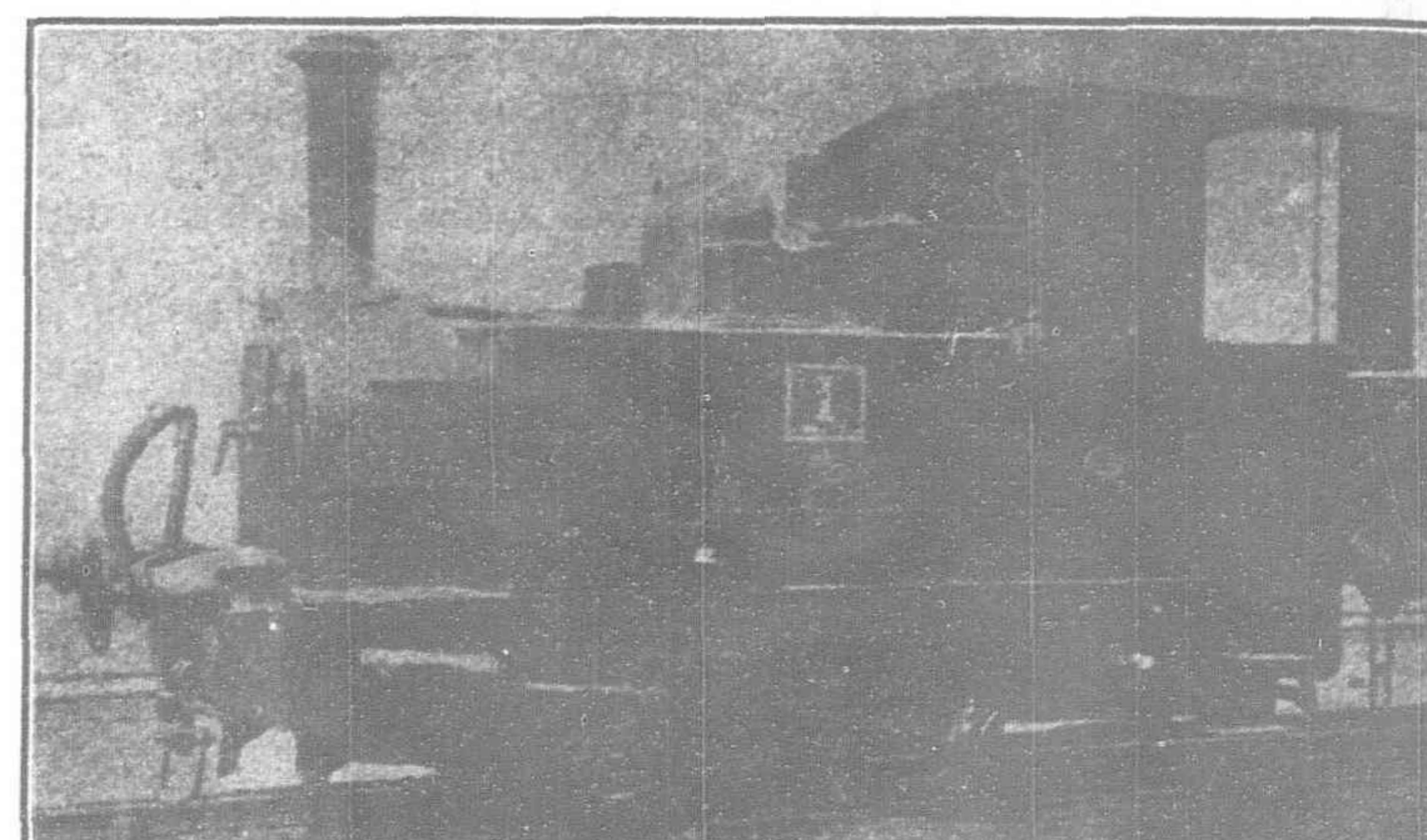
The railway lines in Japan Proper are of narrow gauge, but the railway management is doing its best to effect various innovations in passenger and other services in the matter of comfort, speed, and safety, as far as circumstances permit. The issuing of season and commutation tickets on all sections of the Government Railways and also the electric-car and steam motor-car services in operation on some heavy traffic sections have proved very convenient for interurban and suburban travelers, enabling busy citizens to live in healthy suburban surroundings, and contributing much to the development of the environs of cities and towns. Also the speed of trains has been gradually accelerated to the great convenience of long distance passengers, and their running systems systematized, as referred to above. Through services on various sections have to a large extent done away with



JAPANESE DRAWINGS OF MODELS OF LOCOMOTIVE AND WAGONS WHICH COMMODORE PERRY PRESENTED TO THE SHOGUN



SCENE AT COMMODORE PERRY'S PRESENTATION OF GIFTS TO THE SHOGUN FROM AN OLD PRINT



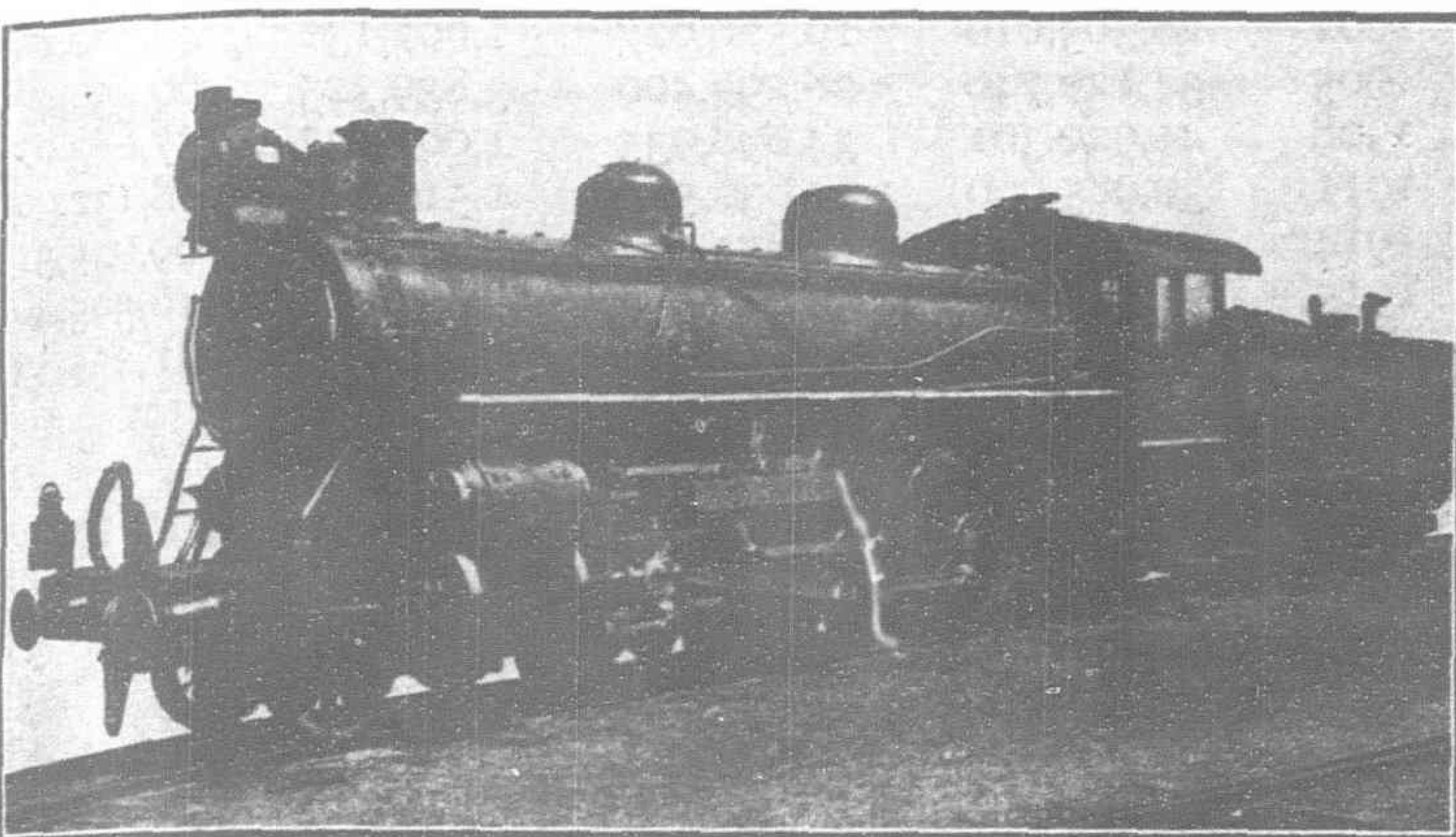
LOCOMOTIVE INTRODUCED IN THE EARLY PERIOD

the necessity of transfer at junctions, and through trains now run between Ueno (Tokyo) and Aomori via the Joban Line (along the Pacific coast), and via the Ou Line (along the northeastern coast on the Japan Sea), and through train services on the trunk line between Tokyo and Shimonoseki have been increased in number, inaugurating the daily train-de-luxe chiefly for the benefit of through travelers to Chosen, Manchuria, and farther afield to China and Europe. Various equipments in passenger cars have been improved and train staffs increased in number and refined in quality. In comparison with 1910, the present train speed has cut off about four hours west of Tokyo and more north of Tokyo. The passenger fares were made cheaper on the trunk line sections, as follow:

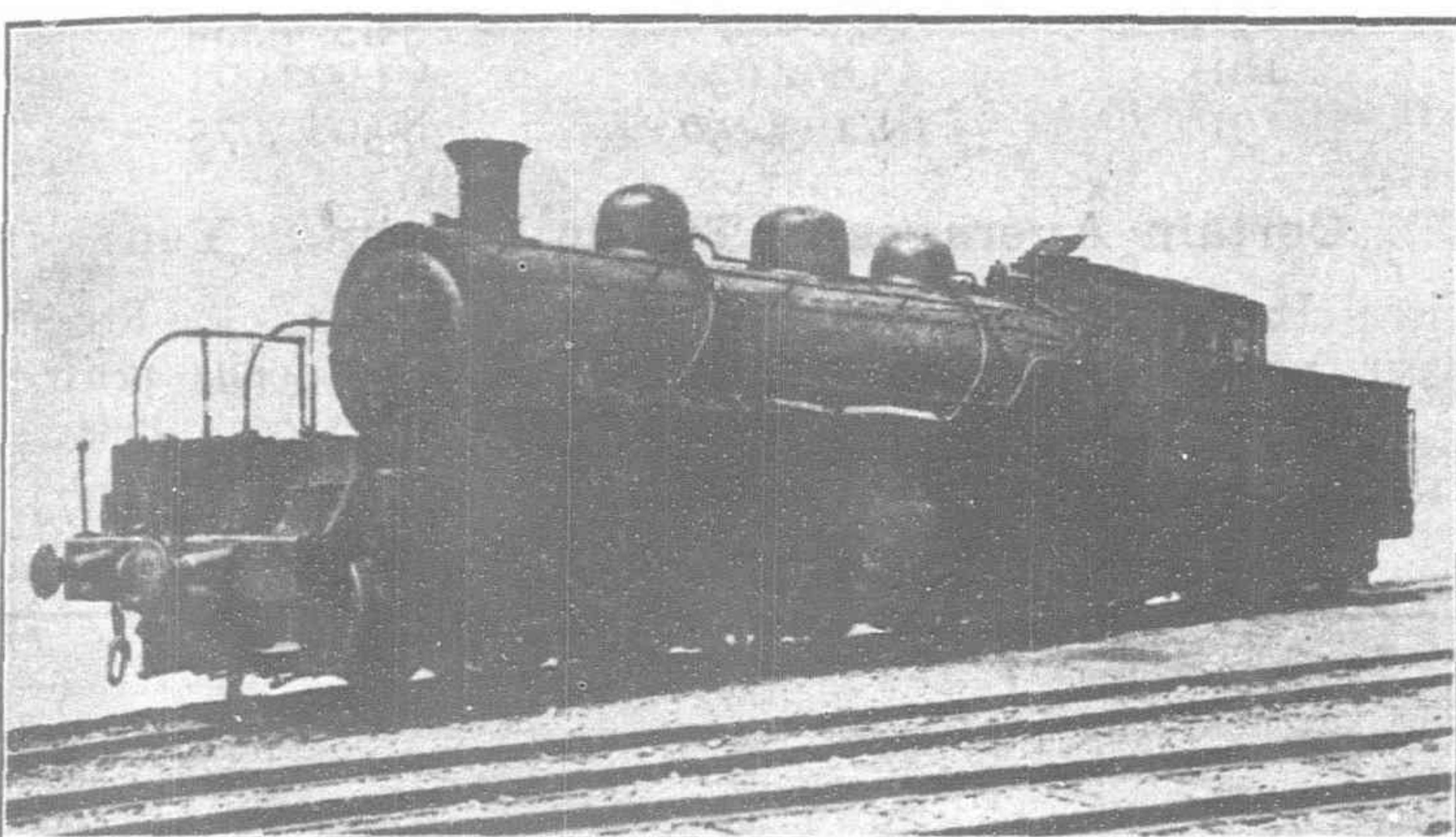
	1st class	2d class	3d class
Tokyo-Aomori	Y.0.91	Y.1.34	Y.0.89
Tokyo-Shimonoseki	5.12	3.81	1.50

Not only the Main Island, but both Kyushu and Hokkaido are now provided with express and through trains running at high speed, and an equal degree of excellence of service is now assured in these comparatively remote districts.

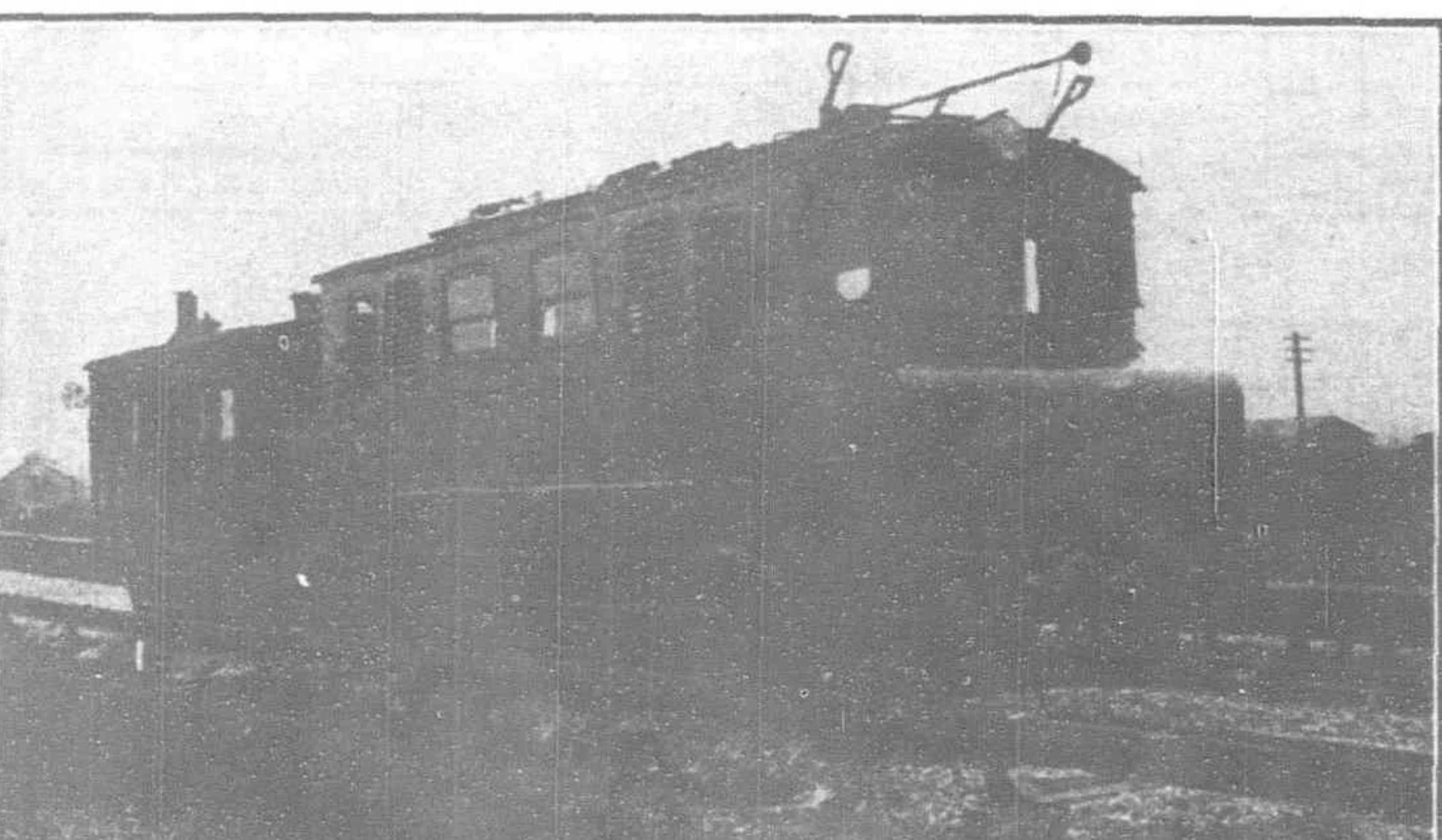
Among various latest arrangements for goods traffic, the most important are the inauguration of collection on delivery for wagon goods and parcels, and the extension of the systems for paying at destinations freight charges and incidental expenses and also for advancing the last mentioned expenses, which were formerly in force locally. The great benefit resultant from these arrangements can be statistically verified.



PASSENGER LOCOMOTIVE NOW IN USE



FREIGHT LOCOMOTIVE RECENTLY PUT IN USE



ELECTRIC LOCOMOTIVE IN USE ON TOKYO-YOKOHAMA LINE

In addition to these new departures, the Government Railways have been making strenuous endeavors to make both passenger and goods traffic as smooth as possible. The principal sections of lines have been doubled and even quadrupled where necessary, bridges and tracks made solid, and many stations renewed. Now the new buildings of such metropolitan termini as Tokyo, Shimbashi, and Manseibashi, and the stations in Yokohama, Kyoto, Moji, etc., form attractive features of these cities. Besides, the utmost efforts are being made to improve all passenger cars, goods wagons, and locomotives, as already mentioned in one of the preceding paragraphs. Although the expenditure since 1908 for improvements on the former lines amounts roughly to more than Y.140,000,000, ideal equipments are inadequate to meet the ever-increasing quantity of passenger and goods traffic. In the busiest seasons, the lack of sufficient transportation capacity hinders the free circulation of wagons, and scarcity of rolling stock inevitably accompanies the accumulation of goods at various points. This is also true with passenger traffic, and there occur cases of unavoidable overcrowding of passenger cars. In order to be fit for the natural expansion of the national strength

and discharge their duty as the common carriers to the fullest extent, it is urgently necessary for the Government Railways to spend more for the improvement of the existing lines and to bring their transportation capacity to perfection. Special mention must be made of the unusual activity in traffic occasioned by abnormal delivery of goods traceable directly or indirectly to the war. The growth of the railway traffic was considerably impeded at the commencement of the war, but the sudden uprise of industry and the shortage of ships' holds have thrown the railways into a struggle with car shortage, and the gross earnings has reached a phenomenal figure of 66 million yen in coaching and 71 million yen in freight since April, 1916, up to date.

The extension of new lines into every nook and corner of the Empire has been steadily pushed on. As already pointed out at the outset, the increase of length of lines since the nationalization reached 1,388 miles at the end of 1915 and the capital invested in them amounted roughly to Y.150,000,000. Consequently more remote parts of the Empire have been provided with railway lines, and even where traveling was formerly done only on foot or by jinrikisha, and the conveyance of goods only on horseback or by men, railway facilities are enjoyed and traveling and transport have been made much more economical in expense and time. Of course the extension of railway lines is still unsatisfactory, as is fully known to the public, and future efforts should be in the direction of perfecting railway systems and making them as far-reaching as possible.

Improvements and new departures in both passenger and goods traffic are as outlined above, but such matters as accelerating train speed, making trains and tracks better appointed, simplifying transactions, etc., still require much of the attention of the railway authorities in future.

Future facilities are offered by the operation of efficient channel steamer services between Fusan and Shimonoseki for Japan Proper-Chosen connections, between Aomori and Hakodate for the Main Island-Hokkaido connections, and other short launch services, in order to carry out efficiently through conveyance of passengers and goods from or to the Continent and between the different islands forming Japan Proper.

#### Through Traffic Development

As the Japanese Empire is comparatively small in area and her development owes much to the expansion of the sphere of her activity over the seas, the nation cannot be satisfied with the progress of internal business alone, but taking advantage of the Empire's position in the center of the Pacific trade and travel, efforts have been incessantly made to perfect international through traffic relations for the extension of her national activities. With this in view, through traffic arrangements have been of late put into force one after another. There are, on one hand, the through booking arrangements for passengers and their luggage to and from neighboring lands such as Chosen, North and South Manchuria, Russian Maritime Province, China, and farther afield to and from European Russia and West Europe over the trans-Siberian route, while, on the other, arrangements exist for the issuing of interchange tickets between Japanese and Chinese ports of call with the chief trans-Pacific and Suez steamer lines, with a view to breaking the monotony of a sea voyage by overland journeys.

The through traffic of goods was opened in 1914 with North Manchuria and Russian Maritime Province and through conveyance of silk to European Russia via Siberia. Thus, to-day the Imperial Japanese Government Railways are striving to carry out passenger and goods traffic services most effectually not only within but beyond the limits of the Japanese Empire. No effort has been spared to meet with the requirements of the present day for the convenience of passengers. Express trains with dining and sleeping cars run on principal lines, and frequent trains serve every nook and corner of the Empire. In fact, the excellent accommodation in the trains in conjunction with the provision of railway hotels—Sanyo Hotel at Shimonoseki and Nara Hotel in the peaceful surroundings of Nara, afford such convenience and comfort as were never expected by the people of not long ago in this country. With regard to these oversea through traffic

arrangements, efforts towards perfection should be made in earnest and the international position of the Japanese Empire elevated more to turn her geographical advantages to the development of her economical relations.

Some Statistics showing the Progress of the Government Railways.

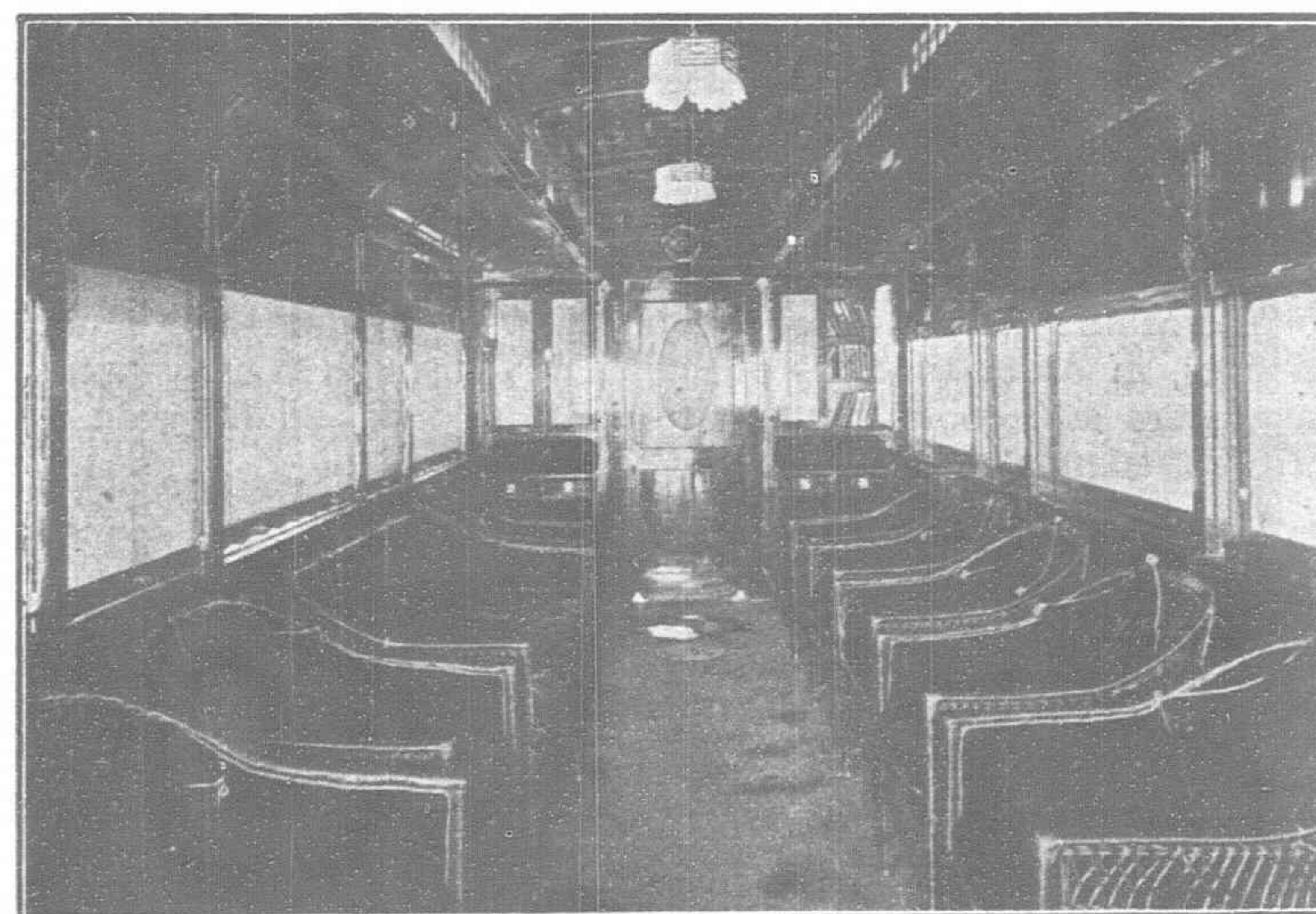
Figures before the railway nationalization are the total of those for the Government Railways and the private railways nationalized.

#### Miles Open to Traffic

Fiscal year	Miles open at the end of the year
1892	1,830.2
1897	2,768.9
1902	3,844.0
1905	4,345.8
1908	4,542.9
1911	5,044.1
1914	5,585.1
1915	5,756.9
1916	5,860.0

#### Passenger and Goods Traffic

Fiscal year	Passengers	Passenger miles	Goods in tons	Ton miles
1892	25,935,490	572,206,013	2,673,848	136,500,476
1897	76,089,173	1,414,985,083	8,360,029	409,988,854
1902	95,672,218	1,767,578,228	15,300,351	897,083,372



OBSERVATION PARLOR OF EXPRESS TRAIN

1905	97,701,960	2,381,339,652	20,278,673	1,333,378,644
1908	123,227,543	2,743,203,558	23,524,559	1,829,429,158
1911	151,077,779	3,382,586,411	29,337,054	2,347,871,475
1914	166,092,421	3,623,743,236	35,272,875	2,982,798,481
1915	172,290,045	3,856,536,966	35,800,664	3,309,518,677
1916	197,043,320	4,255,374,717	42,100,734	4,179,134,660

#### Car and Train Miles

Fiscal year	Car miles	Train miles
1892	—	7,587,852
1897	—	17,635,987
1902	451,406,349	29,599,664
1905	560,527,085	33,818,809
1908	771,844,901	43,422,967
1911	899,629,853	49,605,446
1914	1,071,026,028	57,378,867
1915	1,151,358,267	59,300,482
1916	1,309,821,152	64,543,374

#### Traffic Receipts (Yen)

Fiscal year	Passengers	Goods	Miscellaneous	Total
1892	6,167,277	2,527,913	204,548	8,899,738
1897	17,083,213	8,148,188	611,547	25,842,948

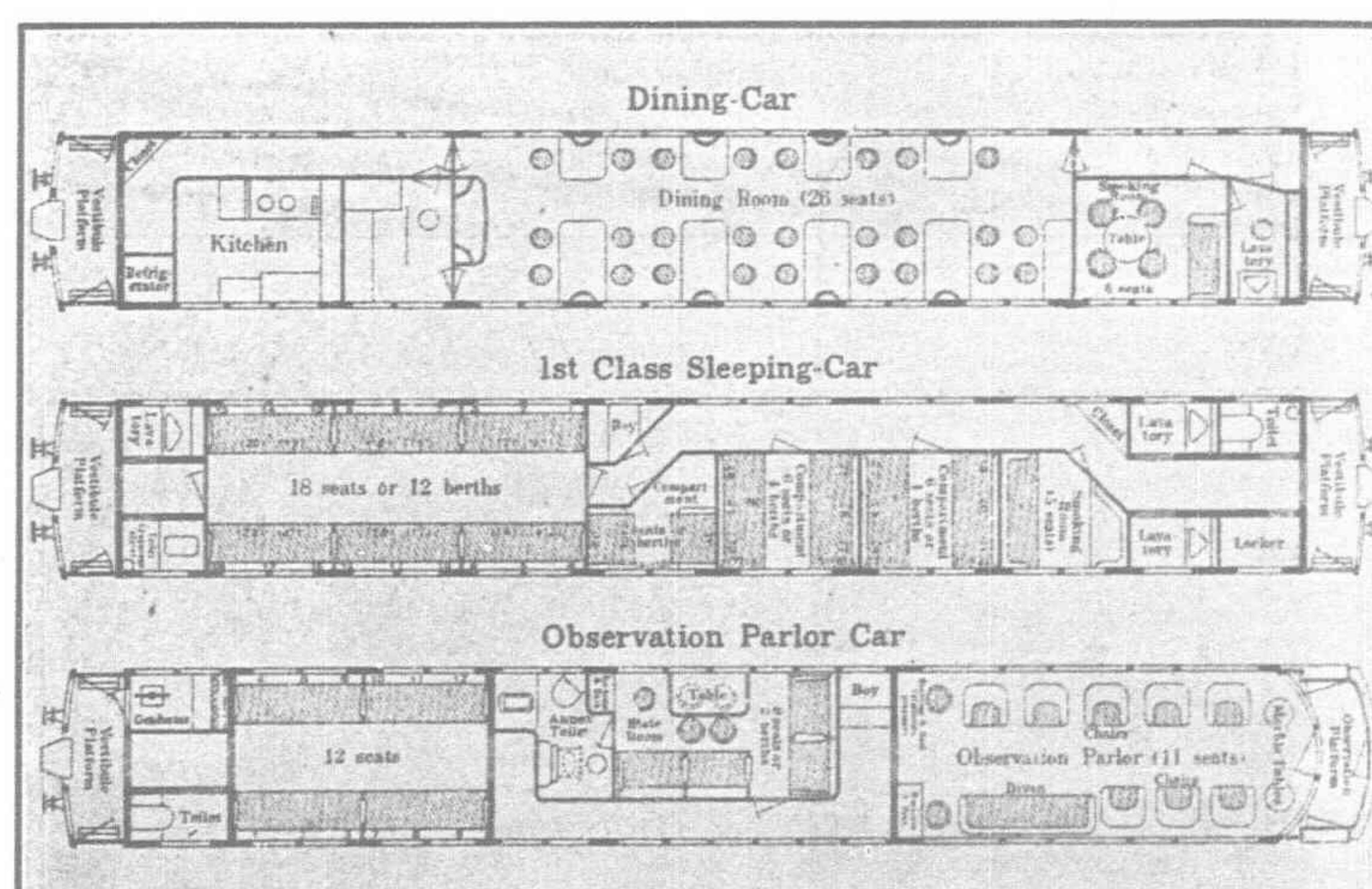
1902	28,305,010	19,570,027	1,607,131	49,482,168
1905	34,126,740	28,293,400	3,839,325	66,259,465
1908	41,920,361	34,898,935	1,063,777	77,883,073
1911	50,985,660	45,636,565	1,510,675	98,132,900
1914	55,044,167	52,451,363	2,429,981	109,925,511
1915	57,282,341	56,666,369	2,646,696	116,595,401
1916	66,399,041	71,638,107	3,218,186	141,255,334

#### Traffic Balances (Yen)

Fiscal year	Operating expenditure Yen	Profit Yen
1892	4,281,516	4,618,222
1897	12,413,553	13,429,395
1902	23,167,002	26,315,166
1905	28,857,998	37,401,467
1908	41,096,073	36,787,000
1911	44,251,827	53,881,073
1914	55,360,979	54,564,532
1915	53,802,030	63,992,603
1916	61,163,450	80,086,075

#### Certain Averages of Traffic Receipts (Yen)

Fiscal year	Passenger receipts per passenger mile Yen	Goods receipts per ton mile Yen	Receipts per mile open Yen	Receipts per train mile Yen
1892	.01078	.01852	.004	1,173



PLAN OF SPECIAL DAILY LIMITED EXPRESS CAR

1897	.01207	.01987	10,147	1.465
1902	.01600	.02182	13,297	1.672
1905	.01436	.02121	15,360	1.959
1908	.01528	.01908	17,259	1.726
1911	.01507	.01944	19,824	1.978
1914	.01519	.01758	19,682	1.916
1915	.01482	.01752	20,560	1.953
1916	.01522	.01660	24,536	2.189

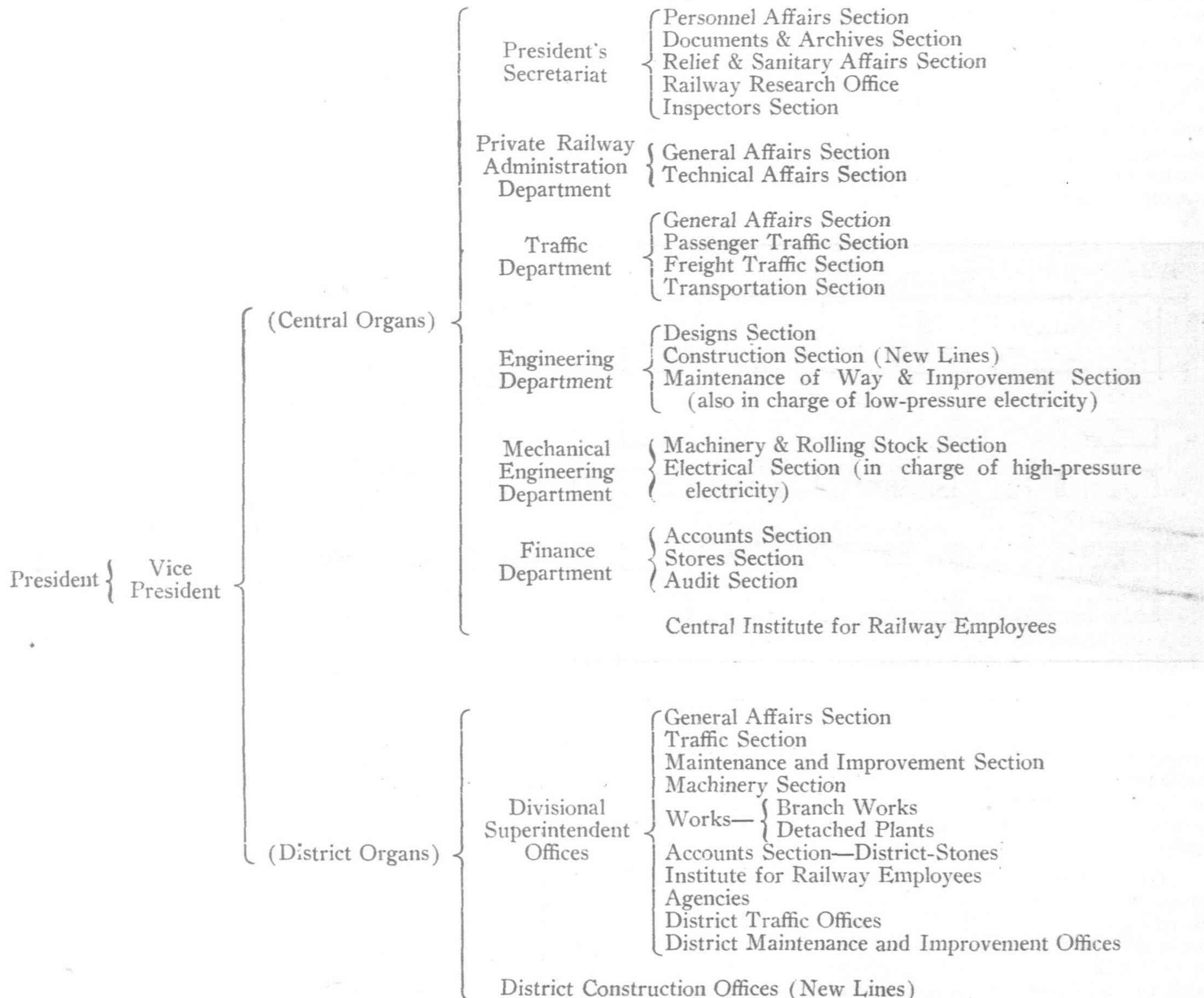
#### Certain Averages of Operating Expenditure (Yen)

Fiscal year	Operating expenditure per mile open	Ditto per train mile	Ditto per passenger ton mile
1892	2,407	.56126	.00604
1897	4,874	.70388	.00680
1902	6,226	.78268	.00869
1905	6,690	.85332	.00777
1908	9,107	.94640	.00899
1911	8,939	.89208	.00772
1914	9,912	.94763	.00838
1915	9,391	.89218	.00751
1916	10,527	.94763	.00724

Fiscal year	Certain Average per day per mile (Yen)			Other Statistics			
	Traffic receipts Yen	Operating expenditure Yen	Profit Yen	Fiscal year	Ratio of expenditure to receipts	Capital (approximate) April 1	Ratio of profit to capital
1892	13,710	6,595	7,115	1892	.481	Y. 80,305,294	.057
1897	27,800	13,353	14,447	1897	.480	136,725,350	.098
1902	36,430	17,058	19,372	1902	.468	323,445,766	.081
1905	42,082	18,329	23,753	1905	.436	397,637,340	.094
1908	47,284	24,950	22,334	1908	.528	706,582,633	.052
1911	54,163	24,424	29,739	1911	.451	819,198,477	.066
1914	53,923	27,156	26,767	1914	.504	967,001,763	.056
1915	56,175	25,658	30,517	1915	.457	1,000,469,583	.064
1916	67,238	28,517	37,791	1916	.433	1,108,060,329	.073

These figures include the actual prices of the nationalized lines.

**Diagram Showing the Organization of the Imperial Government Railways of Japan**  
(Revised in June, 1915)



**The Tokyo (Central) Station**

The Tokyo Station stands near the Imperial Palace in the middle part of Tokyo. A converging point of several railway lines, the station buildings are grand in structure and the newest in style. Its main building, 1,104 ft. in length and 66 ft. to 138 ft. in breadth, is in the Renaissance style, and covers an area of 11,640 sq. yds. The eaves of the building are 54 ft. high from the ground while the height of the dome measures 124 ft. The main materials used for construction consist of 9,940,000 bricks, 2,400 yards of granite, 8,800 cu. yds. of concrete and 3,100 tons of steel. On the ground floor are the rooms for dignitaries as

well as the hall, the waiting rooms, the booking office, and the place for the delivery of luggage, while the first and second floors are devoted to a dining hall, business room, etc. The cost of construction amounted to Y.3,000,000. The work was completed to September, 1914, and was opened to traffic on December 25, 1914.

**Construction and Operation Speed, Carrying Capacity, etc.**

The gauge being narrow, the maximum carrying capacity of a train is 300 tons on the Tokaido and the Sanyo line. The

fastest speed developed is that on the Tokyo-Yokohama section, 18 m., the distance being covered in 28 minutes. As regards the long distance running, the train run between Tokyo and Shimonoseki, 704.5 m., is covered in 25 hrs. 8 mins. by the down train and in 25 hrs. 15 mins. by the up train. Osaka is the busiest station as to number of trains arriving and departing, 273 trains of all descriptions being received per day. The longest nonstop section is that between Himeji and Okayama, 55 m.

*The Gauge.*—The gauge is 3 ft. 6 ins., that having been adopted when the first railway in Japan was laid. The rails used being generally 60 pounds, in speed and carrying capacity Japanese railways are much behind those in Europe and America. As yet, with the exception of the Tokaido line, most of the lines are single track. In the Sanyo, Nippon, and a few other lines, however, partial doubling has either been effected or is in course of completion.

*Reconstruction Scheme.*—A far more ambitious project is the proposed program announced by the Government in November, 1910, of reconstructing the trunk lines from Tokyo to Shimonoseki, 800 miles, on the broad gauge plan, at the estimated outlay of Y.220,029,100 spread over 12 years. The improvement that the existing narrow gauge line requires to keep the service in line with the progress of the country is estimated to total Y.269,644,190, or a little over Y.20,000,000. This reconstruction plan, however, was indefinitely postponed from financial considerations by the second Saionji Ministry and its successors, but schemes have been started afresh by the present Cabinet to rebuild the tracks so that wagons of different width may be run in the same train as a

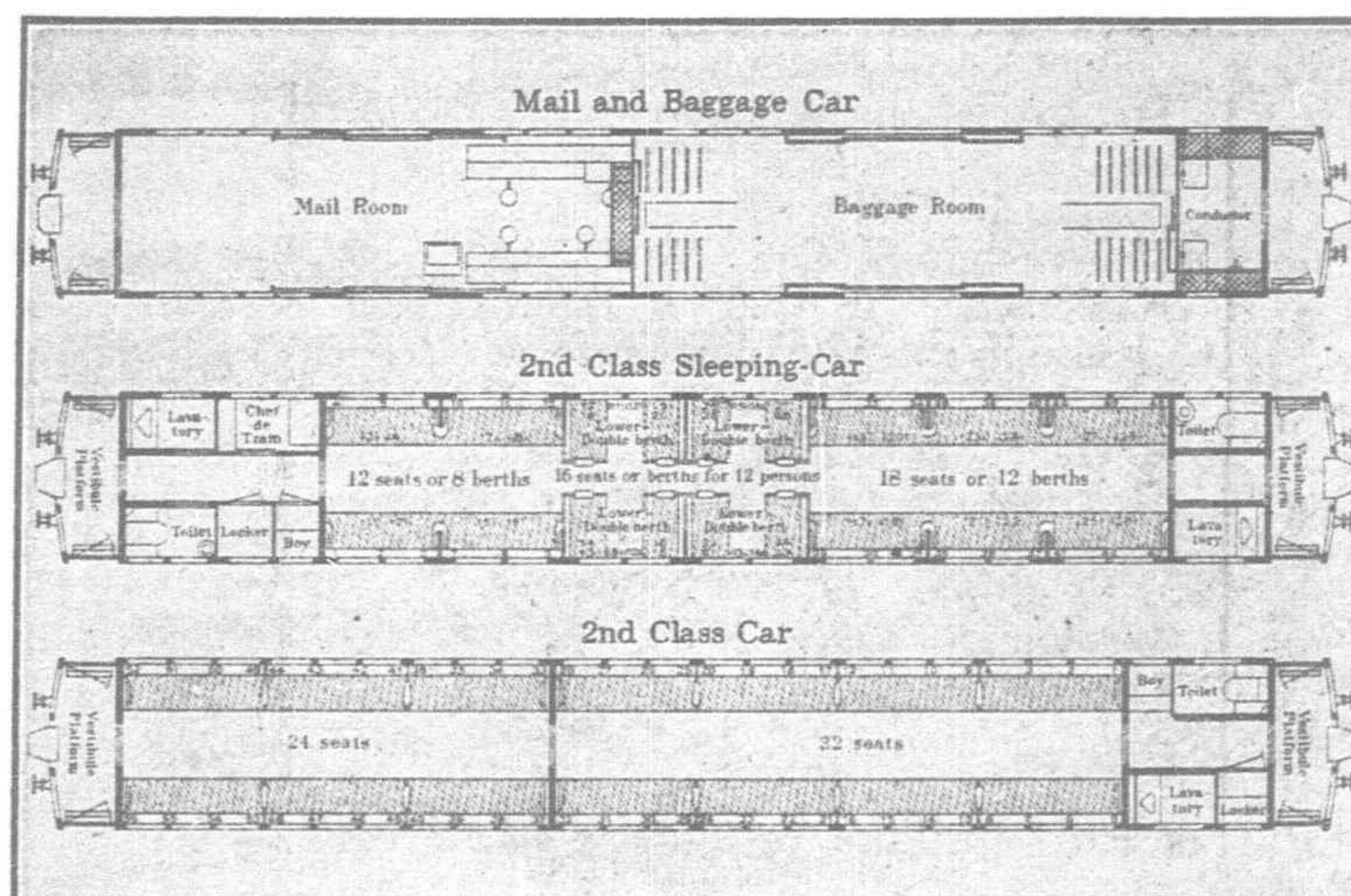


DIAGRAM OF THE SHIMBASHI-SHIMONOSEKI EXPRESS CAR

preparatory step to the standardization, and experiments are being made near Yokohama with satisfactory results. As the shortage of hauling capacity has long been felt, standardization will necessarily be realized to cope with the ever increasing volume of traffic, as soon as finance permits.

*Gradient.*—The maximum gradient is 10 in 40 in ordinary cases, with the minimum radius of 15 chains. A notable exception is the case of the Usui Pass on the Tokyo-Nagano line for which the Abt system was adopted. The gradient for it is 1 in 15, for the section of 7 miles from Yokogawa to Karuizawa, with the minimum radius of 13 chains. There are 26 tunnels with the aggregate length of 14,645 ft. Altogether this section forms the worst portion in the whole work of railway construction in Japan. The steam locomotives at first used on this section have been recently replaced with electric locomotives with the double object of increasing the hauling power and of getting rid of the nuisance of smoke. The change has proved highly satisfactory.

*Tunnels.*—In regard to tunneling work, there are 25 tunnels of over 2,000 ft. That bored at Sasago on the Tokyo-Shiojiri of the Central line is the longest, it measuring 15,260 ft., and required about six years, it being opened to traffic in February, 1893.

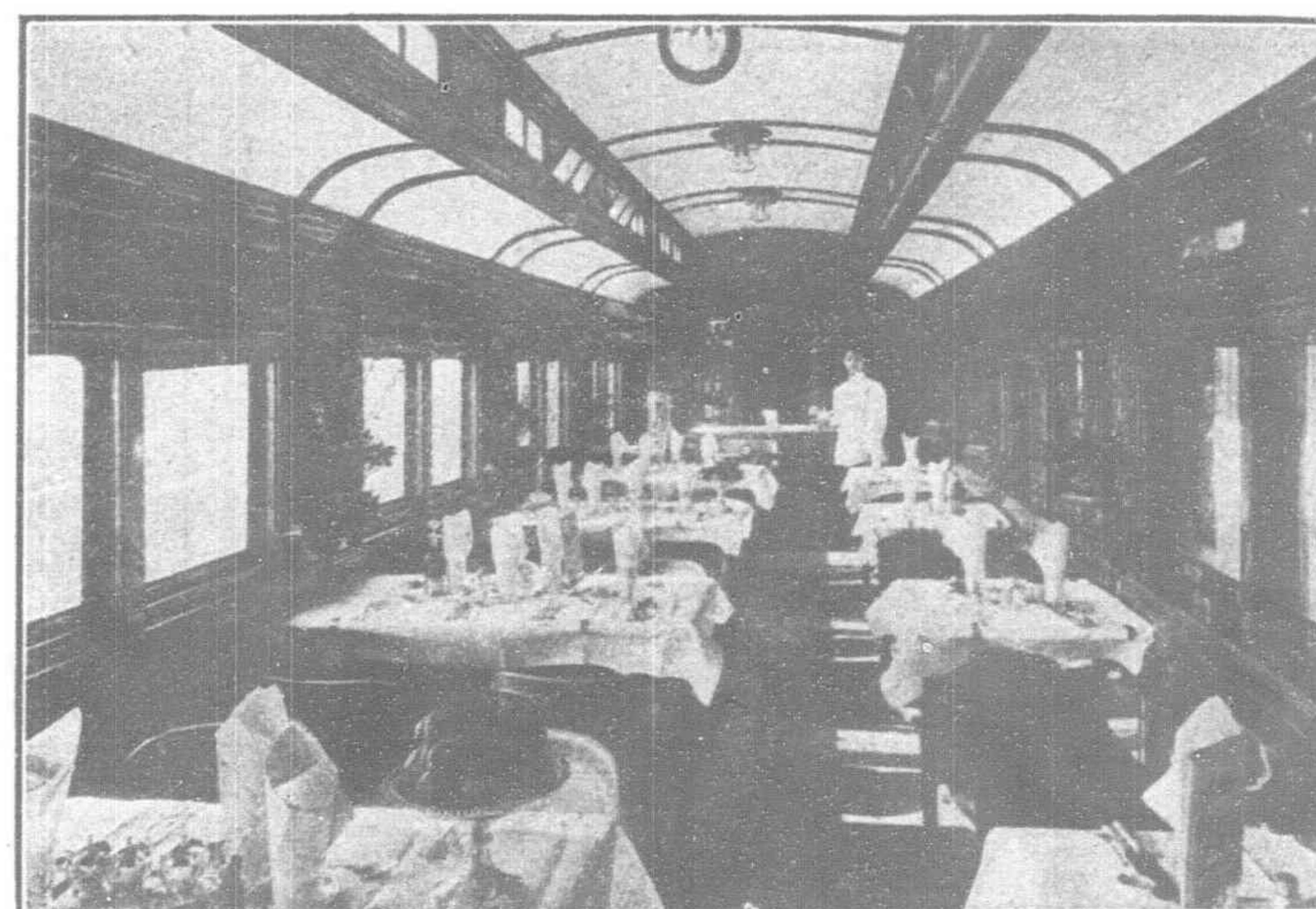
*Rails.*—Rails used are in most cases 60 lbs. per yard steel rail, but they are to be replaced with 75 lb. type for trunk lines, in view of the steady expansion of the volume of traffic and the necessity in consequence to run heavier trains. The rails formerly used came from abroad, but of late the rails turned out at the Government Steel Works at Wakamatsu, Kyushu, and some other works are used.

*Sleepers.*—The standard dimension of the sleepers is 8" x 5 1/2" x 6'0", and 14 to 16 are laid for every 30 ft. of rails. Chestnut wood is predominant, but owing to growing scarcity of this particular lumber, softer varieties, as pines, tamo, cercidiphyllum, sen, beech, are mixed, after they are properly creosoted.

### Bridge Work

The longest structures is that over the river Tenryu (3,967 ft.), the second over the Oi (3,332 ft.), and the third over the Ba-nyu (2,126 ft.), all in the Tokaido line. The foundation work for all such bridges is in the shape of a cylindrical brick well with steel girders. In rare cases wrought iron girders used in bridges made in the early days of railway construction in Japan are mixed with them.

*Amarube Trestle Bridge.*—The Amarube trestle bridge spans a valley 1,000 ft. in width and 129 ft. in depth, situated 27 miles east of Tottori station, San-in main line (Kyoto-Niima). The bridge consists of 11 trestles laid over by 60 ft. span plate girders. The bridge is 1,019 ft. in length, and its construction required 994 tons of steel. The work continued from December, 1909, to January, 1912, and cost Y.330,000.

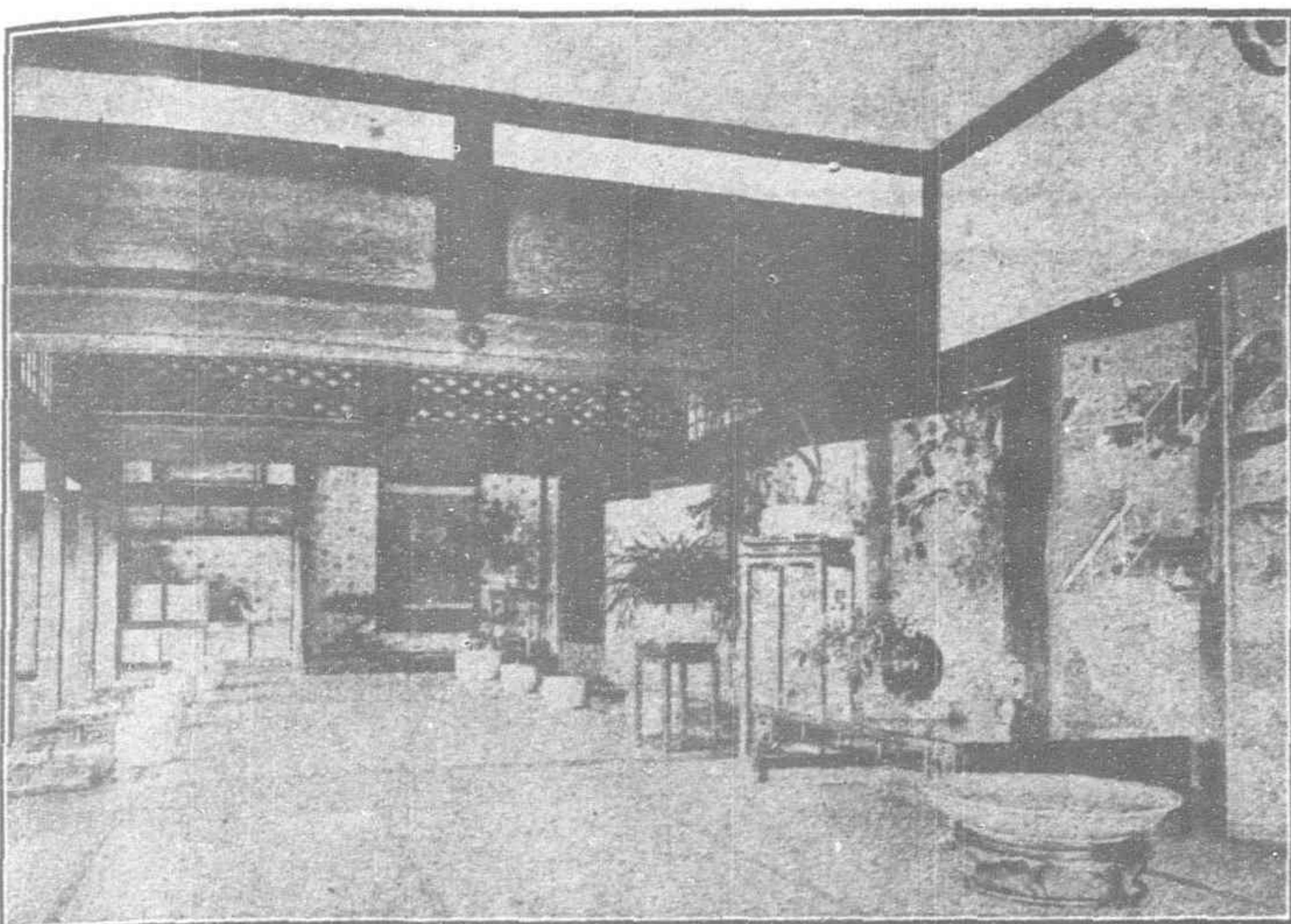


INTERIOR OF A DINING CAR

*Kamanowaki Bridge.*—The Kamanowaki bridge is spanned over the river Akanogawa on the Gan-Etsu line (Koriyama-Niitsu). The bridge is 521 ft. in length, consisting of one span of 300 ft. Schweder truss and 2 spans of 108 ft. Pratt truss. The cantilever method was adopted in the construction of the bridge, the rapidity of the current together with the depth of the river (the deepest part of the bed reaching 129 ft. below the formation level) having rendered the structure of scaffolding exceedingly difficult. The work was completed in May, 1913, the total cost being Y.158,298.

### International Traffic Arrangements

*Trans-Siberian Through Traffic.*—Arrangements exist between the Imperial Government Railways of Japan and the railways in Russia and West Europe for the through transportation of passengers and luggage. The through traffic to and from West Europe is known by the name of the "Trans-Siberian International Traffic"; that with the through railways in European Russia, as the "Russo-Manchurian-Japanese Traffic"; and finally that with the Chinese Eastern and Ussuri railways as the "Manchurian-Japanese Through Traffic." The sections over which the through transportation of passengers and luggage is carried on via Dairen or Vladivostok (in the case of the Manchurian-Japanese Through Traffic, via Chosen, also), are as follow:



TYPICAL RECEPTION ROOM IN A WEALTHY HOME

To Japan from railways in West Europe. Amsterdam (Central station, Weetperpoort, or Muiderpoort). Antwerp (Central or South station), Berlin (Metropolitan station), Bordeaux (Saint Jean), Boulogne Ville, Bremen, Brussels, Calais Maritime, Cherbourg, Cologne, Dieppe, Dover, Frankfort (on Main), Hamburg, Altona, Hague (State Railway or Holland Railway stations), Havre, Liege (Guillemin), Lille, London, Lyons, Marseilles, Nantes, Ostend (Quai), St. Nazaire, St. Quentin, Vienna (North station), Paris, Botterdam (Mass, Beurs, or D. P.)

From Japan to London, Paris, Berlin, and Vienna.

(To Vienna from Tokyo and Yokohama only.)

*Russian Railways* from or to Petrograd, Moscow, Warsaw, Odessa, Irkutsk, Verdzbolovo, Riga, Alexandrovo, Granitza, and Kiev. (From Japan, to the first four cities only.)

*Chinese Eastern and Ussuri Railways*, from or to Manchuria, Tsitsihar, Harbin, Vladivostok, and Habarovsk.

*Imperial Government Railways*, from or to Tokyo, Yokohama, Kyoto, Osaka, Kobe, Shimonoseki, Moji, and Nagasaki. (Railway City Offices in Tokyo, Yokohama, Kyoto, and Osaka.)

*Through Traffic to West Europe*.—For Vienna via Moscow-Warsaw

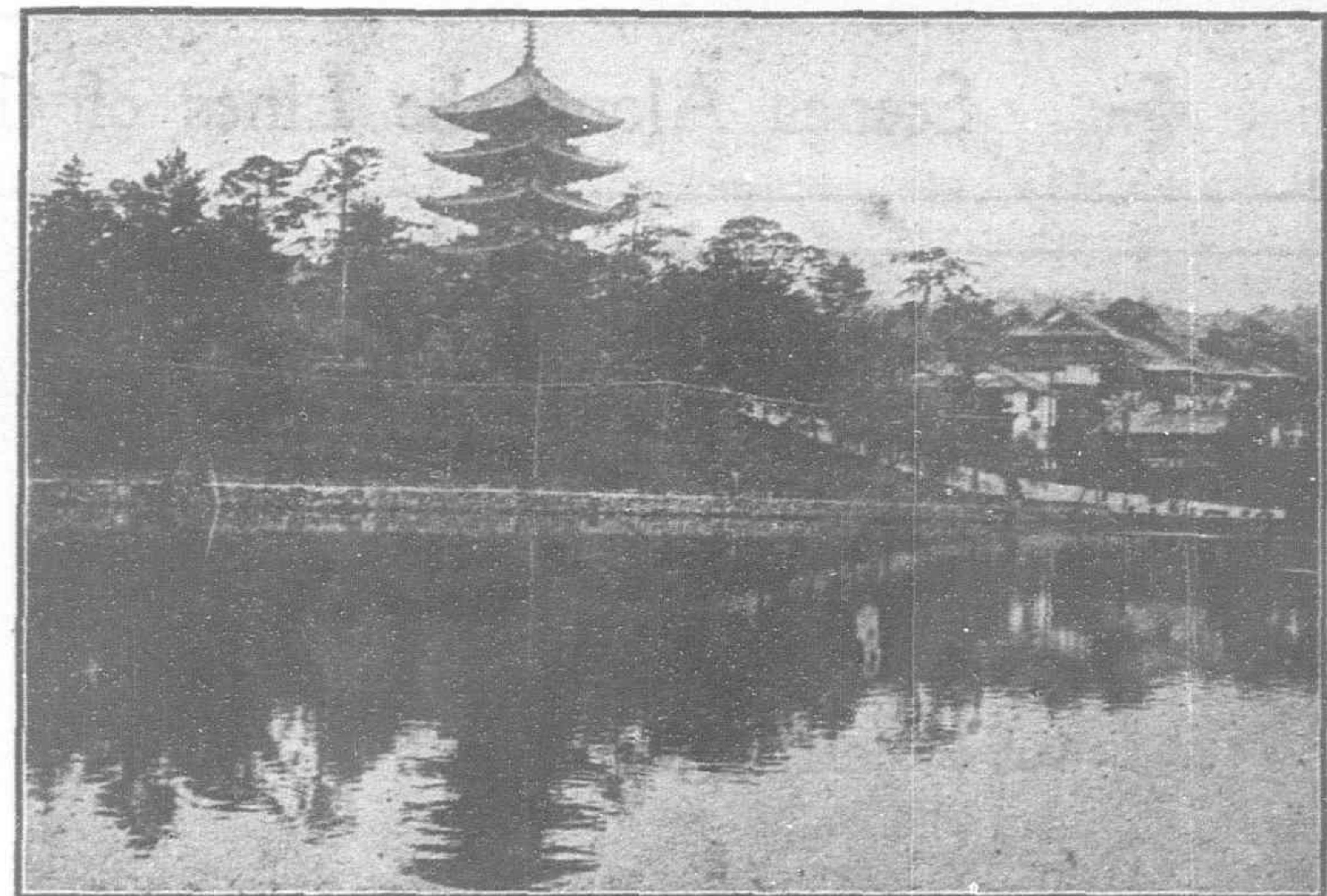
For Berlin via {  
 Moscow      Petrograd-Verdzbolovo  
 Viatka  
 Moscow-Warsaw      Alexandrovo  
 Skalmierzyce

For Paris via Berlin-Aix-la-Chapelle-Verviers-Liége-Jeumont

For London via Berlin-Aix-la-Chapelle-Liége-Ostend-Dover

Berlin-Hannover-Hoek-van-Holland-Harwich

*Coupon Books*.—For Trans-Siberian International Traffic first and second class coupon books good on all trains and available for 3 months.



SARUZAWA LAKE. ONE OF NARA'S SCENIC ATTRACTIONS

For Russo-Manchurian-Japanese Through Traffic first and second class coupon books good on all trains, and second and third class coupon books good on ordinary trains. Both available for 60 days.

For Manchurian-Japanese Through Traffic first and second class coupon books good on express trains, and first, second, and third class coupon books good on ordinary trains. Both available for 35 days.

*Circular Tours Between Japan and London*.—Under the International Through Traffic arrangements established among certain railways and steamship companies in Europe and the Far East for the circular tour between Japan and European ports via Suez and Siberia, circular tickets between Tokyo, Yokohama, Osaka, or Kobe, and London are issued as follows:

Stations and Offices where the tickets are sold:—Tokyo, Yokohama, Osaka, Kobe, and the City Offices in Tokyo, Yokohama, and Osaka.

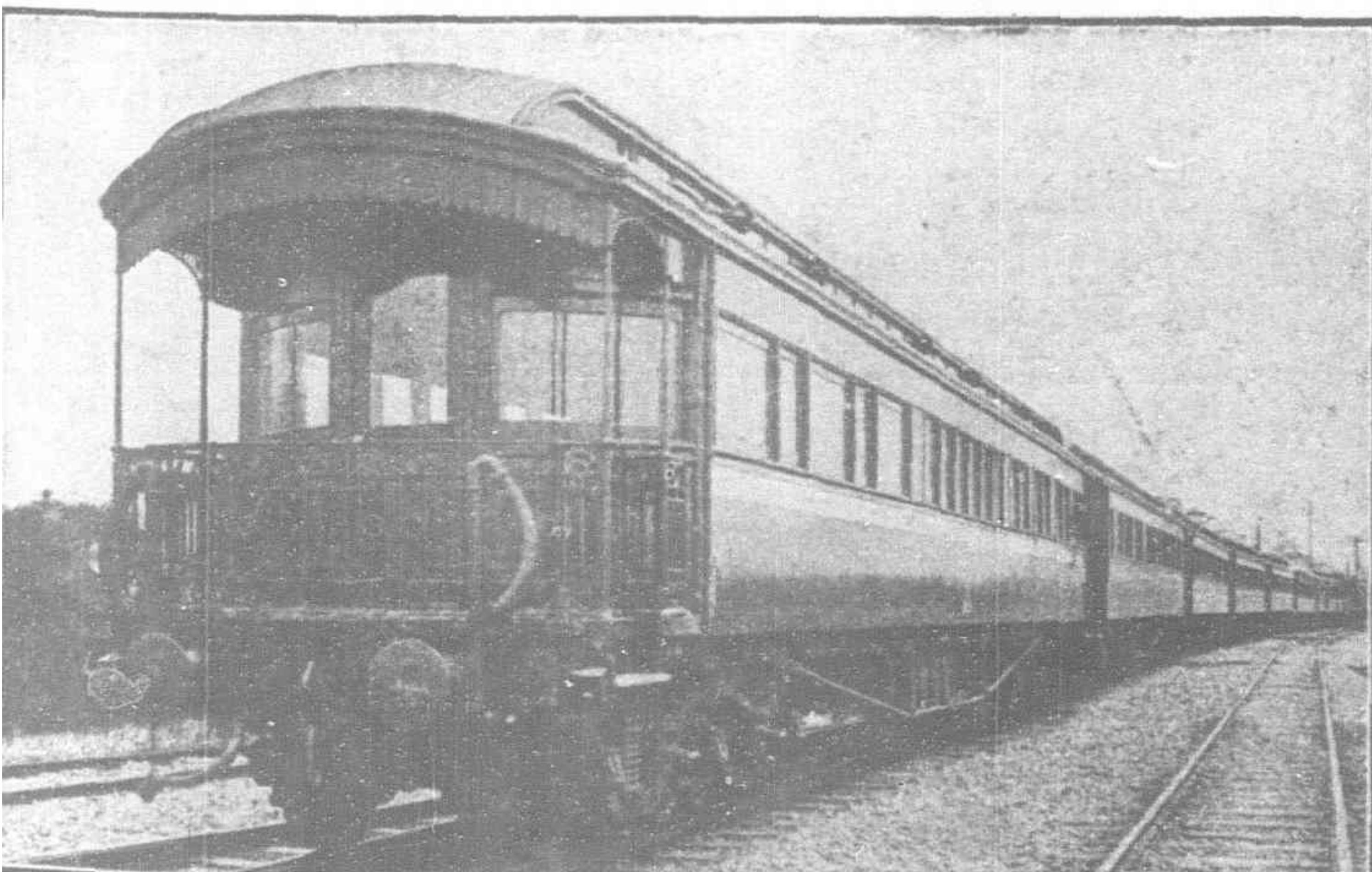
Route covered by the tickets:—Departure point—Shanghai-Suez-London-Ostend-Aix-la-Chapelle-Berlin      Alexandrovo      Moscow-Che-liabinsk-Manchuria      Vladivostok      departure point, or vice versa.      Dairen

Kinds and validity of the tickets:—First and second class, both available for 24 months.

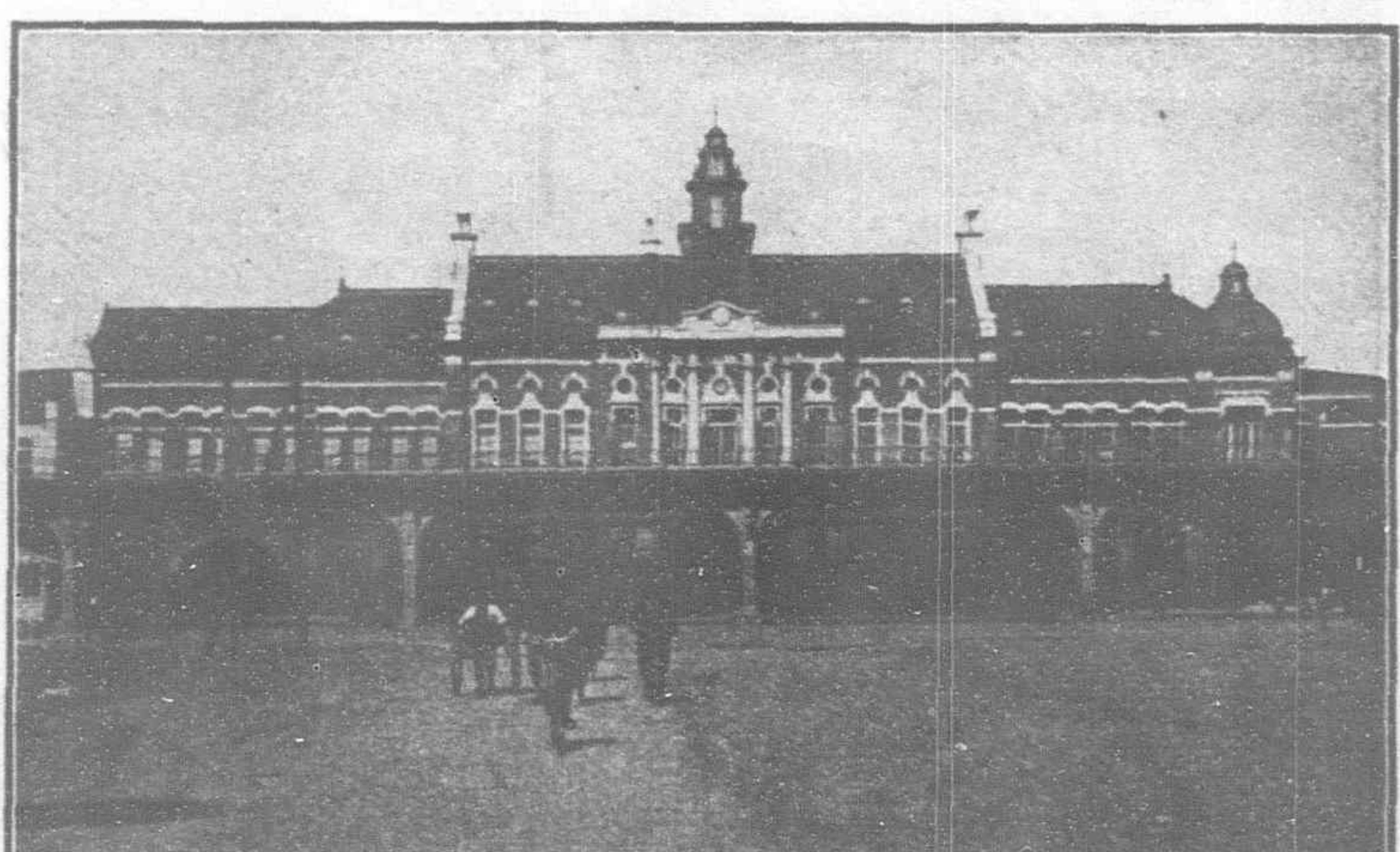
*Around-the-World-Tours*.—The Around-the-World Tour arrangements have been made in coöperation with the Canadian Pacific Railway Steamship Co., via Moscow or Petrograd over the Trans-Siberian Route, Starting from Yokohama, Kobe, and Nagasaki.

### Japan-China Through Traffic

In consideration of the economic relation destined to grow closer between Japan and China, a Conference sat at Tokyo in 1913 to open the passenger through traffic between the Peking-Mukden Line and Japanese



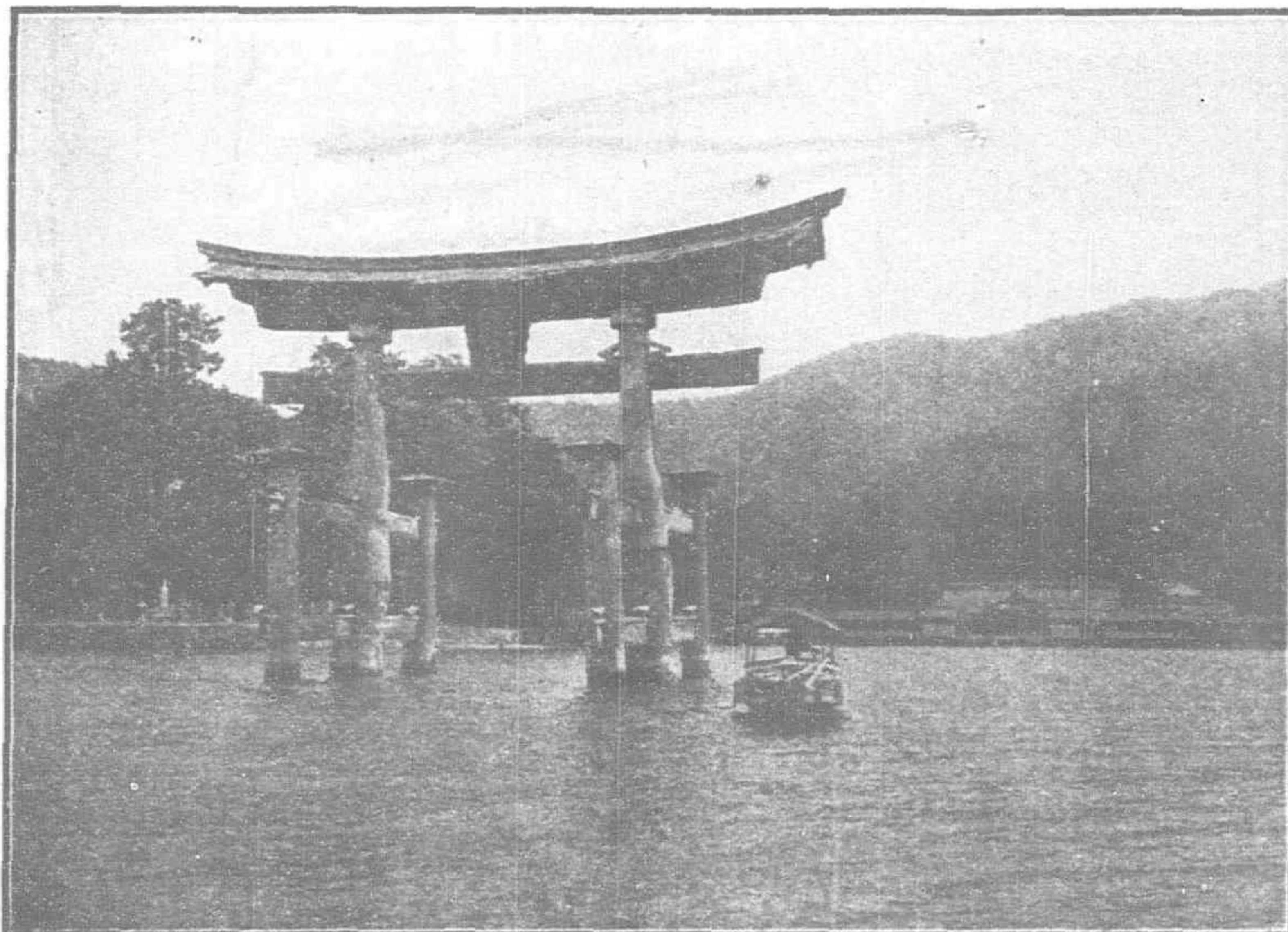
OBSERVATION CAR ON EXPRESS TRAIN



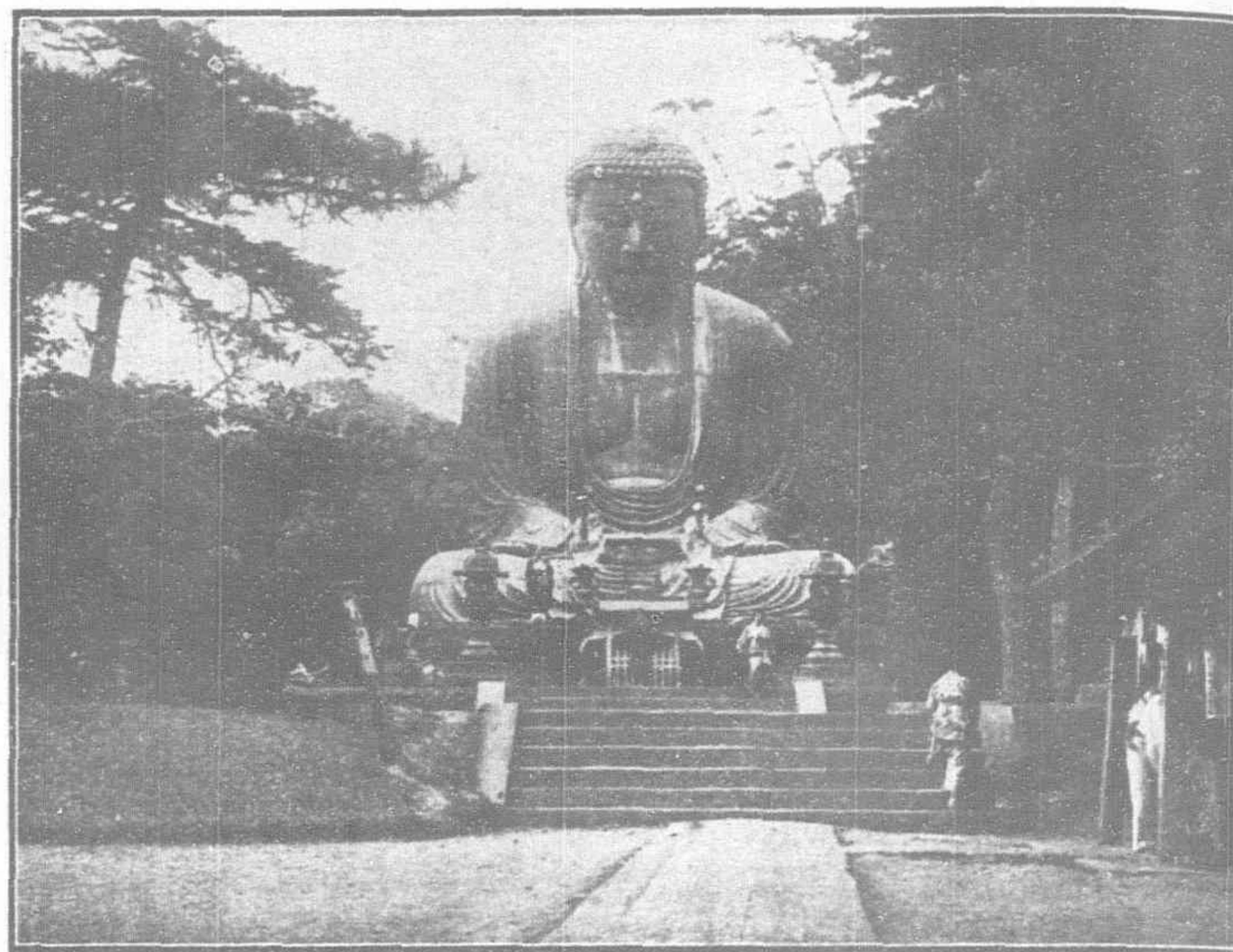
YOKOHAMA STATION



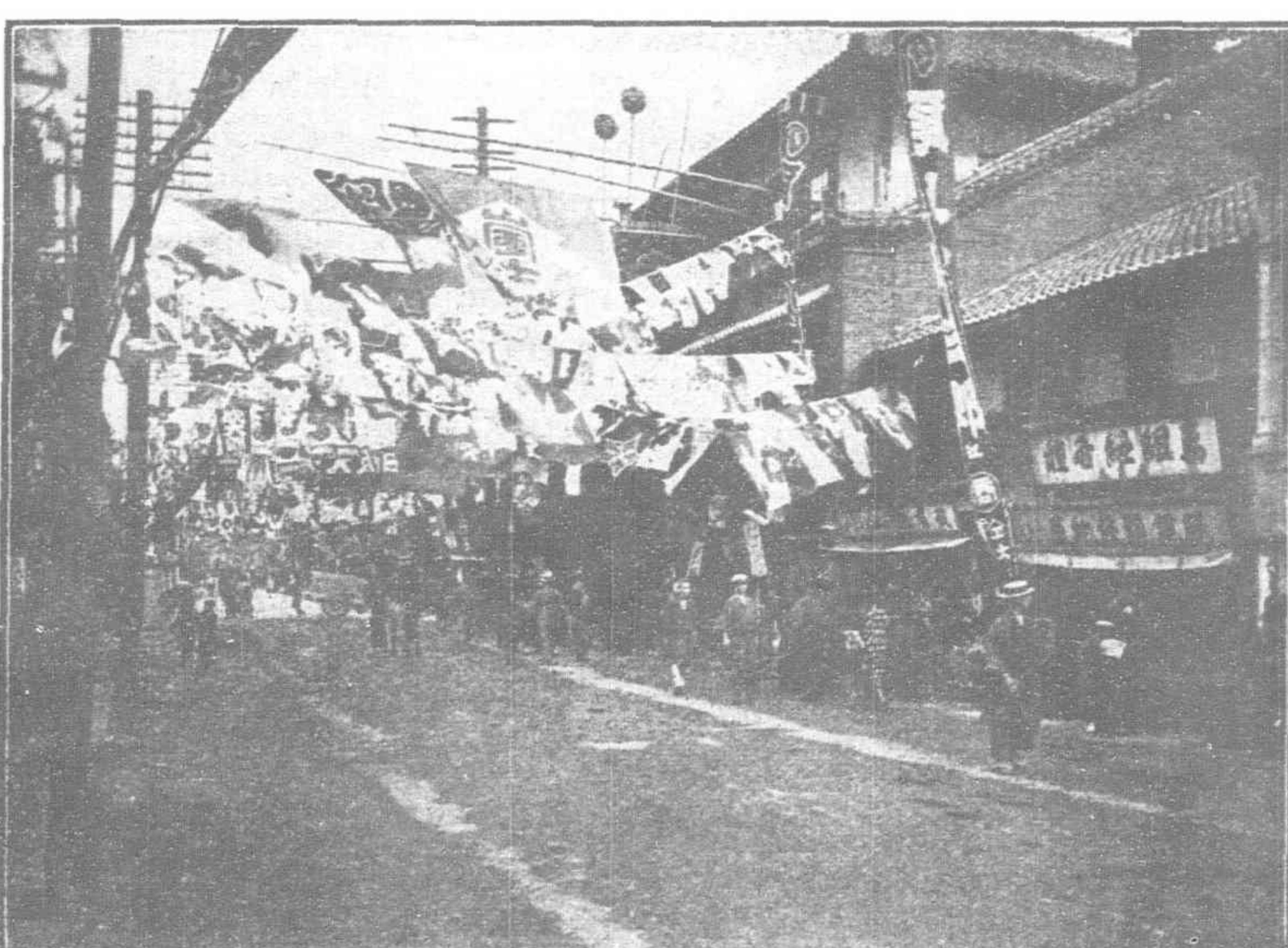
## Scenes Along the Lines of the Imperial Japanese Railways



FAIRY-TALE LANDSCAPE OF MIYAJIMA



COLossal BUDDHA AT KAMAKURA



OSAKA STREET IN HOLIDAY ATTIRE



HIMEJI CASTLE BUILT IN THE XIVTH CENTURY



SUMA ON THE SANYO LINE



Mt. FUJI

railways. Difference in the standard of currencies, discrepancies in regulations between the various railways, etc. made the arrangement difficult to conclude, but thanks to the concession on the part of the Chinese representatives through traffic was opened in October, 1913.

After several conferences, the through traffic arrangement has attained its perfection, and practically all the railways in Middle and North China have come to participate in the present arrangement.

Stations and City Offices open to the Through Traffic.

Imperial Government Railways of Japan

{ Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Sannomiya, Kobe, Shimonoseki, Moji, and Nagasaki.  
City Offices in Tokyo, Yokohama, Nagoya, Kyoto, and Osaka.

Chinese Government Railways

{ (Peking-Mukden Line) Peking, Tientsin, Shantung, and Hsiaokuan, and Hsinnan.  
(Peking-Suiyuan Line) Kalgan and Nankow.  
(Peking-Hankow Line) Hankow, Chekiatshouang, and Tchengtcheou.  
(Tientsin-Pukow Line) Pukow, Hsuehfu, and Tsinanfu.  
(Shanghai-Nanking Line) Shanghai and Nanking.  
(Shanghai-Hangchow-Ningpo Line) Hangchow.

*Routes.*—The route open to the present through traffic is via Fusan, Antung, and Mukden. Passengers will travel by the Imperial Government Railways to Shimonoseki or Moji from their respective departure points in Japan. Passage from Shimonoseki to Fusan is effected by one of the channel steamers run by the Imperial Government Railways. On landing at Fusan pier, passengers will board the trains of the Chosen Railway, which traverse the peninsula and reach Antung. Here passengers for Mukden must change to the trains of the South Manchuria Railway, unless traveling by the Chosen-Manchuria Through Express. Mukden is the terminus of the Chinese Peking-Mukden Line, the trains of which come round to the Mukden station of the South Manchuria Railway, where passengers have to change cars. On the Peking-Mukden Line, through trains are run daily between Mukden and Peking (Chengyangmen station). Passengers for the stations of the Tientsin-Pukow Line and beyond have to change at Tientsin. Again for the Shanghai-Nanking Line, passengers will proceed from Pukow to Nanking Ferry or Hsiakuan by steam launch. The ferry is one mile distant from Nanking station and principal express trains only depart from the ferry station. For the Shanghai-Hangchow-Ningpo Line, passengers change cars at Shanghai North Station.\* For the Peking-Suiyuan Line, through passengers have to proceed from Peking Chengyangmen station to Hsichihmen station by the Round City Branch and take the main line trains at the latter station. To reach the destinations on the Peking-Hankow Line, there are two routes, viz., via Peking and via Fengtai. If following the former route, passengers are required to arrange for their own conveyance in Peking between the Peking-Mukden Line station and the Peking-Hankow Line station. Passengers via the latter route have to change at Fengtai, and again at Changsintien to join the main line trains.

*Coupon Books.*—The coupon books are of three kinds, namely, first, second, and third class, and are available for 40 days, including day of issue.

*Free Luggage Allowance.*—Luggage up to 160 lbs., 120 lbs., and 80 lbs., is allowed free for the first, second, and third class through passenger, respectively.

*Through Return Tickets.*—Japan-China Through Return Tickets are issued at 20% reduction of ordinary fares, between stations open to the Japan-China Through Traffic, with the privilege of prolonged validity of 100 days including the day of issue.

*Party Trip Tickets.*—Japan-China Party Trip Tickets are issued as follow:

*Fares:*—For 10 or more passengers at 25% reduction on all railway lines.

For 20 or more passengers at 30 or 50% reduction on Japanese Railway lines; at 30% reduction on Chinese Railway lines.

Local Rates of Party Reduction shall be applicable when such rates are higher than those shown above.

*Validity of Tickets.*—Two months.

*Routes.*—Return trips between Japan and China via Chosen or Circular Tours.

Any other information and assistance in planning party trips will be cheerfully supplied by the Traffic Departments of the Head Office and Divisional Superintendent Offices of the Imperial Government Railways, the through booking stations and city offices, etc., or may be obtained in Chosen or China.

*Circular Tours.*—For the benefit of tourists from Japan to China, or vice versa, Circular Tour Tickets between Japan and China are issued at 30% reduction for railways and 25% reduction for steamers over the circular routes joining the railway route via Chosen and the steamer routes on the Yangtze and between Shanghai and Japanese ports, roughly as follow:

Stations, etc., where Booked:

*Imperial Government Railways of Japan:*

Japan-China Through Traffic stations and city offices and Fusan Port. (For the routes covering the N. Y. K. steamer line to Shanghai as the first section from Kobe, Shimonoseki, Moji, and Nagasaki, the N. Y. K. offices book tourists, but the railway stations do not.)

*Chinese Government Railways:*

Japan-China Through Traffic stations. (Except Chekiatshouang and Tchengtcheou on the Peking-Hankow Line and Hsuehfu on the Tientsin-Pukow Line. For the routes covering the N. Y. K. and N. K. K. steamer lines as the first section from Shanghai and Hankow, the steamship companies' offices book tourists, but the railway stations do not.)

*Circular Tour Routes.*—There are two circular routes from Japan. From Japanese points to Peking tourists will travel via Chosen, the two routes diverging at Peking. By the first of the two routes, Hankow is reached by the Peking-Hankow Line, whence tourists sail by the N. K. K. steamer down the Yangtze to Shanghai. By the second route, tourists turn back from Peking to Tientsin, whence they proceed to Shanghai via Tsinanfu, Pukow, and Nanking by the Tientsin-Pukow and the Shanghai-Nanking Lines. The passage from Shanghai to Japanese ports is performed by the N. Y. K. steamers, passengers landing at Kobe when bound for stations east of Kobe. The routes are reversible, viz., first sailing to Shanghai and coming back via Chosen.

Passengers from Fusan Port will reach Shimonoseki by the I. G. R. channel steamers, whence they sail for Shanghai and then return to Fusan by way of Peking and Antung, via Hankow or via Nanking-Tsinanfu.

Passengers from China are scheduled to reach Tokyo via Chosen and, turning back to Kobe, sail for Shanghai, thence returning to their respective departure points. The route is reversible.

The above is a general description of the circular tour routes. First and second class steamer passengers between Japanese ports and special class steamer passengers between Nanking and Shanghai are enabled to travel by rail instead of by steamers. Also the two routes between Nagoya and Osaka via Maibara-Kyoto and via Kameyama-Nara are open to tourists' option.

### Classes of Accommodation


Classes of Tickets	1st	2d (Superior by steamers)	2d	3d
I. G. R. and Chosen Ry.	1st	2d	2d	3d
S. M. R. and C. G. R.	1st	2d	2d	2d
N. Y. K.	1st	1st	2d	3d
N. K. K.	Spec.	Spec.	Spec.	1st

(Chinese or Foreign 2d.)

Foreign second class accommodation is limited to the S. S. Fengyang, and holders of second class (not superior by steamers) circular tour tickets may obtain a refund of the difference between special and foreign second class (Y.12.00 for passengers departing for Japan and \$12.60 for passengers departing from China) on application to the N. K. K. branch office at the port of embarkation.

*Period of Availability.*—Four months including day of issue.

Reduction Certificates attached to each ticket entitle the holders to 30% reduction for return tickets on the following sections and for the classes corresponding to those of their Circular Tour Tickets.



### SOME OF THE INTERESTING PLACES OF JAPAN

As shown on the pictorial chart above Japan has many places of extreme interest to the visitor, all of which are easily reached over the lines of the Imperial Government Railways, and in most of these excellent hotel accommodation, either European or native can be found. The places pictured on the chart are as follow, in the order of the circled engravings from left to right: Kagoshima—Site of one of the most active volcanoes in Japan. Kumamoto—Scene of some very wonderful temples and much natural beauty. Nagasaki—One of the famous ports of the Orient. Beppu—Famous hot springs and resort. Inland Sea—This name is applied to that sea between Kobe and Moji. Its wooded islands and rocky shores present a wonderful variety of color and form. Osaka—A great manufacturing center of Japan. Nagoya—Site of a wonderful feudal castle. Center for porcelain manufacture. Hakone—Famous mountain resort district, where there are numerous hot springs and resorts, set in wonderful scenery. Mt. Fuji—A sacred mountain of Japan. One of the great sights of the world. Tokyo—Capital of the Empire, site of the Imperial Palaces. Engraving shows part of the new railway station. Kamakura—Here is found the giant statue of Buddha. It is also a famous resort. Yokohama—shima—One of the most beautiful places in all Japan. Hakodate—Chief seaport of the island Hokkaido, northernmost of the Japanese islands. Sapporo—Sight of the great college and a very interesting natural scenery. Mining District—The mining district of Japan. Copper and other metals are found in this neighborhood. Kashiwazaki—The centre of the oil district of the empire. Japan Alps—A very mountainous region of superb scenery. Kanazawa—One of the silk centers of the empire. The engraving shows a silk loom in operation. Kyoto—The art centre of Japan. The engraving shows part of one of its famous temples. Amano-Hashidate—One of the three most beautiful places in Japan. Nara—Famous for its beautiful shrines and parks. Taisha—Site of the oldest temple of Japan of sacred memories. Miyajima—A famous resort and beauty spot on the inland sea. Shimonoseki—Important terminal of the Imperial Government Railways. Also shipping point. Moji—Center of the coal shipping industry of Japan.

When starting from I. G. R. Yeitoh-Jinsen, Mukden-Dairen, Kou-pangtzu-Newchwang, Peking-Kalgan, Shanghai North-Hangchow.

When starting from C. G. R. Ueno-Nikko, Kameyama-Yamada, Yeitoh-Jinsen, Mukden-Dairen.

*Free Luggage.*—Up to the same limit as for the Japan-China through passengers on railways. On steamer lines: First or Special Class—up to 350 lbs. or 40 cu. ft.; second or Foreign Second Class—up to 250 lbs. or 30 cu. ft.; third or Chinese First Class—up to 150 lbs. or 20 cu. ft.

Exchange Orders are issued at certain stations and city offices instead of regular Circular Tour Tickets. Each order is drawn for separate sections of the tour routes. Passengers furnished with the Exchange Orders are requested to exchange each order for a regular ticket at the departure point of each section.

*Cabin Reservation.*—Tourist passengers are cautioned to apply beforehand to the steamship companies' offices for accommodation; otherwise they may be required to transfer to another class or to wait for the next steamer, if no cabin is found available for them on their arrival at the port of embarkation.

*Overland Tour.*—By this arrangement, travelers, west-bound from Japan, east-bound from China, or past Japan and China, and holding first-class steamer tickets between Yokohama and Shanghai, are enabled to travel overland for sight-seeing between Yokohama and Shanghai or Hankow, on the railway tickets issued by steamship companies roughly as follow:

*Steamship Companies.*—Nippon Yusen Kaisha; Toyo Kisen Kaisha; Canadian Pacific Ocean Services and Pacific Mail S. S. Co.

*Overland Routes.*—Yokohama-Shanghai or vice versa. Landing at Yokohama tourists are scheduled first to visit Tokyo, and thence to travel to Shimonoseki by the Tokaido and Sanyo Lines including a ferry trip from Miyajima to Itsukushima (if desired, via Yamada and Nara by the Kwansai Line between Nagoya and Kyoto or Osaka). Crossing the channel from Shimonoseki to Fusang by the I. G. R. steamers, travelers resume their railway journey to Peking via Seoul, Antung, Mukden, and Tientsin. Turning back from Peking to Tientsin, they take the Tientsin-Pukow Line down to Pukow, via Tsinanfu, and next the Shanghai-Nanking Line to Shanghai, where they embark again. The route is followed in the opposite direction, when landing at Shanghai.

Yokohama-Hankow or vice versa (issued by the C. P. O. S. only).

Between Yokohama and Peking tourists will travel by the same route as described above, and the trip between Peking and Hankow is performed by the Peking-Hankow Line. This ticket does not include the passage between Hankow and Shanghai, for which an exchange order is issued independently by the C. P. O. S.

*Period of Availability.*—Three months including day of issue. Within the period, passengers are entitled to stop over at the principal cities and places of interest and resume their journey by express trains without any additional supplementary payment.

*Overland Railway Fare.*—Yokohama-Shanghai Y.100 (N. Y. K.) or Y.120 (T. K. K., C. P. O. S., and P. M. S. S. Co.); Yokohama-Hankow, Y.110 (C. P. O. S.). (Including Express Charges but Berth Charges payable separately. About 20%-30% reduction on regular cost of travel on the section.)

### Elevated Lines in Tokyo

The Program for the construction of elevated lines connecting the various termini of the lines converging to Tokyo was made out in 1896. The line between Shimbashi to Gofukubashi was completed in 1910, the cost of construction being some Y.9,976,337,000. The section was opened to suburban traffic and upon the completion of the Tokyo station building it was opened to trunk line traffic as well as suburban and interurban traffic.

The construction of the line between Tokyo station and Manseibashi, the terminus of the Central Main Line, was commenced in 1915, with the estimated outlay of Y.2,700,000, and it is expected to be opened to traffic before long. As to the elevated lines from Ueno, the terminus of the North Eastern

Lines and Ryogokubashi, the terminus of the Sobe lines, no definite plan has yet been laid out.

### Lines to Be Opened to Traffic

Lines under construction and expected to be opened to traffic in the fiscal year, 1917, cover thirteen localities and 126 miles.

### Workshops

At the end of the fiscal year of 1915, twenty-three works were in operation, consisting of seventeen main and six branch works. Besides these works four detached workshops were maintained in order to attend to the light repairs of equipment.

During the said fiscal year 2,460 locomotives, 8,752 passenger carriages, and 70,069 goods wagons were repaired; forty-nine passenger carriages, thirty-one electric trams, and 175 goods wagons were constructed.

The total output of the works amounted to Y.10,117,993 in value and 77% were claimed by the repair and reconstruction of equipment and the rest by the manufacture of new equipment and miscellaneous railway appliances.

The rolls of the different works on March 31, 1915, comprised 14,068 workmen, 923 laborers of regular employ, and 347 coolies. The number of days worked aggregated 4,733,749, and the wages paid Y.3,226,747, of which Y.750,255 were paid for piece work.

### Models of a Locomotive and Cars Brought by Commodore Perry

Upon his second visit to Yokohama, in 1853, Commodore Perry presented the Shogun with models of steam locomotives and cars. They were set up at Yokohama by American experts and run before dignitaries, and later they were sent up to Yedo (Tokyo) and inspected by the Shogun himself. To the great regret of those interested the models were afterwards burned.

### Through Transportation of Raw Silk

Through transportation service was inaugurated on June first, 1914, of raw silk from Yokohama to Moscow by arrangement between the Imperial Government Railways and the Osaka Shosen Kaisha on one hand and the Eastern Chinese Railway and the Volunteer Steamers of Russia on the other. The voyage between Tsuruga and Vladivostok is regulated to be eight days, while fifteen days are allotted for the transportation between the latter place and Moscow. For any delay beyond the prescribed duration compensation at the rate of one sixth of freight per day is to be paid by the carriers concerned to the consigner for the Yokohama-Vladivostok conveyance and of one twentieth for the trans-Siberia route ending at Moscow. The freight schedule per 100 kgrms. is as follow:

	From starting station to Tsuruga	From Tsuruga to Vladivostok	Total	From Vladivostok to Moscow per pood
From Yokohama to Moscow	Y.2.50	1.9515	4,1515	
„ Kyoto „ „	1.30	1.6515	2,9515	4.02 R.85 K.
„ Tsuruga „ „		1.6515	1,6515	

Besides 10,075 kopecks are charged per pood on the Russian railways as sundries incidental to the conveyance.

### Private Railways

The private railways open to traffic in Japan, excluding light railways numbered, at the end of March, 1915, eight with an aggregate mileage of 272 m. 48 ch. and a total capital of Y.35,600,000. They are as follow:

Title	Office	Length of line open m. ch.	Track mileage m. ch.	Gauge ft. in.	Paid up capital Yen
Narita Railway	Narita, Chiba-ken	45.06	52.62	3.6	2,425,000
Chuetsu "	Fushigi, Toyama-ken	23.06	27.04	3.6	1,270,000
Nankai "	Osaka	42.15	81.73	3.6	8,133,975
Tobu "	Tokyo	72.33	99.06	3.6	4,883,000
Hakatawan "	Kasuya-gori, Fukuoka-ken	16.34	23.53	3.6	1,535,500
Yokohama* "	Kanagawa	27.49	32.06	3.6	3,140,000
Ashio* "	Tokyo	27.42	33.74	3.6	2,500,000
Tojo "	Tokyo	18.23	19.40	3.6	97,913

\*These two railways are leased to the Imperial Government Railways.

#### Traffic of Private Railways

Year ended March	Number in 1,000	Passenger service			Goods service	
		Mileage in 1,000	Fares Y.1,000	Tonnage in 1,000	Mileage in 1,000	Freights Y.1,000
1911	25,909	191,435	?	2,323	30,984	?
1912	17,838	146,555	?	1,632	27,878	?
1913	16,131	135,117	?	1,746	26,255	?
1914	16,855	144,530	2,119	1,845	30,180	911
1915	17,130	150,753	2,036	2,111	30,671	1,003

#### Finance of Private Railway (in Y.1,000)

Year ended	Paid up capital	Reserves	Receipts	Expenses	Profit
1911	30,542	709	4,541	2,672	2,330
1912	24,376	659	5,364	1,770	1,831
1913	18,114	667	3,285	1,851	1,540
1914	19,453	943	3,532	1,880	1,783
1915	24,985	1,122	3,274	1,382	1,891

#### Light Railways

The Law relating to Light Railways was issued in April, 1911, and was put into force in August of that year. The construction of light railways was formerly subject to various inconveniences, as it was controlled by the ordinary railway or tramway regulations. It was to obviate this difficulty that the special measure was adopted at the instance of Baron Goto, when

he was the President of the Railway Board. This legislative measure aimed at obtaining 2,000 miles with a grant of aid of Y.12,500,000, guaranteeing the profit within the limit of five per cent of the construction expense. The period of grant on one and the same line was extended in 1914 from five to ten years. At the end of May, 1916, the mileage under traffic extended 1,465, that under construction 778, while the mileage under charter represented 1,300, and the grant of aid covered 787 m.

#### Leading Light Railways in Japan

Title	Office	Length of line open m. ch.	Track mileage m. ch.	Gauge ft. in.	Paid up capital Y.
Chugoku	Okayama	50.20	59.17	2.6; 3.6	4,300,000
Iyo	Matsuyama	26.66	30.51	2.6; 3.6	984,000
Jobu	Kumagaya	28.61	35.09	3.6	919,260
Toyokawa	Toyohashi	17.61	22.58	3.6	1,100,000
Tobu	Tokyo	27.43	35.16	3.6	1,300,000
Osaka Koya	Kawachi	28.08	39.47	3.6	1,088,130
Shimabara	Shimabara	26.20	29.06	3.6	798,950
Chiba	Chiba	47.17	55.49	2.0; 2.6; 3.6	859,915
Aichi Elec.	Nagoya	18.26	19.60	3.6	1,173,770
Tosan Elec.	Takamatsu	7.74	8.49	4.8½	1,000,000
Nagoya Elec.	Nagoya	31.03	33.56	3.6	5,000,000
Echigo	Niigata	50.10	57.56	3.6	1,500,000

#### Electric Tramways

Electric tramways are very much in evidence both in cities and the country. The Government is also contemplating the adoption of a dual system of tramways for some sections, this being already put into practice for a section of the Kurobe and Tokaido lines. Especially noticeable has been the electric tramway projects during these few years. At the end of March, 1915,

or the end of the business year 1914, Japan had seventy-one companies and municipalities running electric tramways solely, or combining lighting, with a capital paid up amounting to Y.300 millions. The lines open to traffic extended 822 m. with a track mileage of 1,285. The passenger cars and goods wagons numbered 3,891 and 396 respectively. Further particulars are shown in the following table representing the year ended March, 1915:

	No. of Co.'s	Paid up capital	Debenture & debts	Reserve fund	Receipts total	Of which tramway	Expenditure	Nett profit
Electric railway		Y. 1,000	Y.1,000	Y.1,000	Y.1,000	Y.1,000	Y.1,000	Y.1,000
Electric railway combined with lighting	24	25,599	4,976	745	3,519	3,124	2,241	1,278
	47	234,893	35,768	4,639	37,852	22,840	26,759	11,093
Total	71	Y.260,492	Y.40,744	Y.5,384	Y.41,371	Y.25,964	Y.29,000	Y.12,371

## Leading Electric Tramway Enterprises

## NAME AND LOCATION

		Capital p. u. Y.1,000	Railway mileage	Track mileage	Gauge ft. in.
Tokyo Municipality, Tokyo ..	..	86,977	79.6	158.6	4.6
Keihin El. Rly., Kawasaki ..	..	4,452	17.4	34.7	4.6
Tamagawa El. Rly., Tokyo ..	..	800	5.9	9.3	3.6
Keisei El. Rly., Tokyo ..	..	1,073	8.8	15.7	4.6
Oji El. Rly., Tokyo ..	..	1,000	5.1	10.2	4.6
Kei-o El. Rly., Tokyo ..	..	590	9.5	11.3	4.6
Yokohama El. Co., Yokohama ..	..	5,350	6.4	6.4	3.6
Odawara El. Rly., Odawara ..	..	1,490	7.6	7.6	4.6
Yokohama El. Rly., Yokohama ..	..	4,050	12.7	23.6	4.6
Nagoya El. Rly.,* Nagoya ..	..	4,560	51.3	90.6	3.6
Aichi El. Rly., Nagoya ..	..	1,173	18.4	18.4	3.6
Ise El. Rly., Yamada ..	..	1,225	9.6	12.4	3.6
Keishin Tramway, Kyoto ..	..	1,500	6.6	13.2	4.8½
Kyoto Municipality, Kyoto ..	..	15,007	13.9	27.8	4.8½
Kyoto El. Rly., Kyoto ..	..	5,250	15.8	30.4	3.6
Osaka Municipality, Osaka ..	..	31,911	29.6	59.2	4.8½
Hankai Tramway,*† Osaka ..	..	2,620	13.7	27.2	4.8½
Minoo-Arima Tramway, Ikeda ..	..	3,300	18.1	36.2	4.8½
Nankai Rly., Osaka ..	..	8,133	47.0	73.6	4.8
Hanshin El. Rly., Amagasaki ..	..	5,400	22.1	44.2	4.8½
Kobe El. Rly., Kobe ..	..	11,562	7.8	15.6	4.8½
Hyogo Tramway,* Suma ..	..	2,000	5.6	11.2	4.8½
Tosa El. Rly., Kochi ..	..	1,000	15.7	25.6	3.6
Kyushu El. Light and Rly., Fukuoka ..	..	6,250	5.1	10.2	4.8½
Kyushu El. Tramway, Kokura ..	..	3,937	21.8	43.6	4.8½

## Japan Tourist Bureau

The Japan Tourist Bureau was established in 1912 as a joint enterprise of the Imperial Government Railways, and other railway and steamship companies, hotels, and firms dealing with foreign tourists, and affords special facilities gratis to foreign tourists, such as furnishing all necessary information as to traveling, issuing letters of introduction, securing admission to places of interest, arranging itineraries, giving estimates of expenses, supplying information booklets, etc.

The Head Office is at Tokyo Station, Tokyo

## Branch Offices:

Dairen ..	South Manchuria Railway Building, Dairen.
Chosen ..	Chosen Railway Building, Seoul.
Taipeh ..	Taiwan Railway Hotel Building, Taipeh.
Tsingtao ..	Shantung Railway Building, Ssingtao.

## Ticket and Inquiry Offices:

Tokyo ..	Tokyo Station.
Kobe ..	2 Itchome, Kaigan-dori, Kobe.
Nagasaki ..	4 Oura, Nagasaki.

## Inquiry Offices:

Yokohama ..	78 Yamashitacho, Yokohama.
Shimonoseki ..	Sanyo Hotel Building, Shimonoseki.
Fusan ..	Fusan Station, Fusan, Chosen.
Seoul ..	Chosen Hotel, Seoul, Chosen.
Port Arthur ..	Port Arthur Station.
Dairen ..	S. M. R. Office; Yamato Hotel.
Mukden ..	Yamato Hotel, Mukden.
Changchun ..	Changchun Station.

## Agencies Abroad:

New York ..	Japan Society, 165 Broadway.
San Francisco ..	Branch Office, T. K. K., 625 Market St.
Seattle ..	Branch Office, N. Y. K.

Those marked \* are the companies undertaking transportation business only, the rest combining it with other business, such as electric supply and lighting (vid. Electricity, Chap. on Industry).

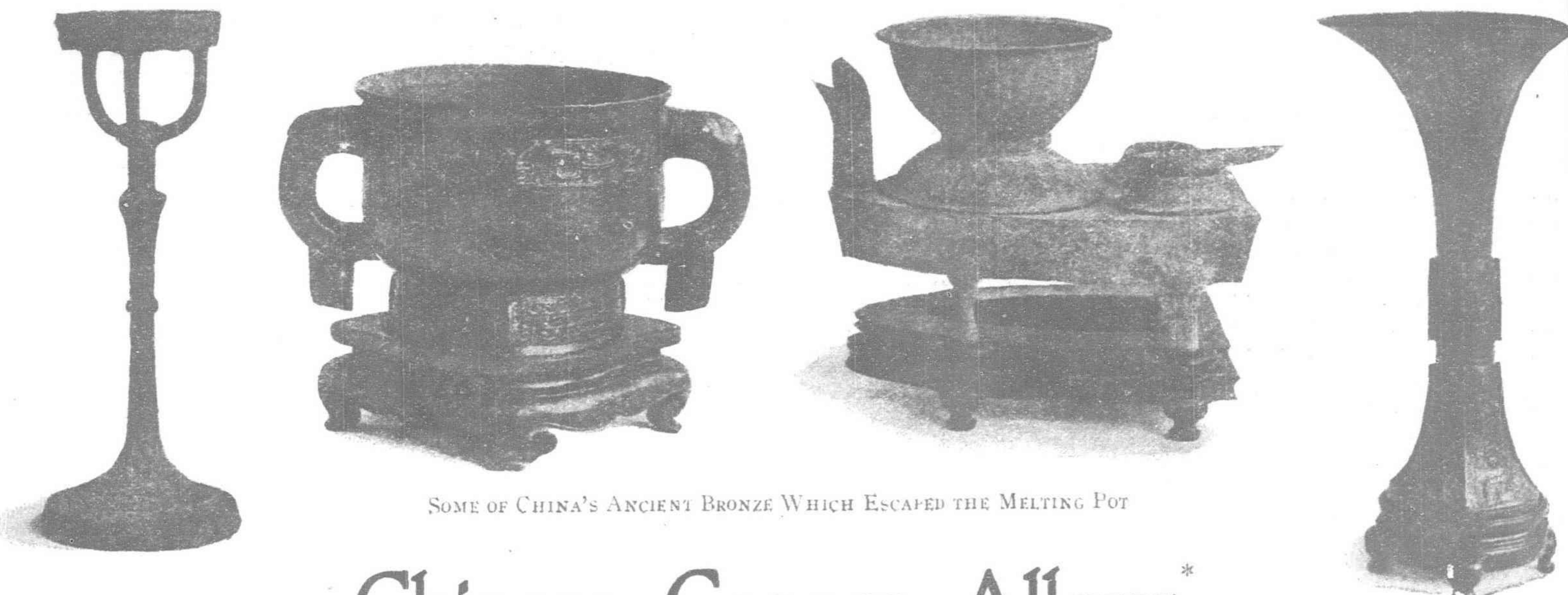
† The Hankai Tramway was afterward absorbed by the Nankai Railway.

Tacoma, Wash ..	Branch Office, O. S. K. c/o C. M. & P. S. Ry.
Los Angeles ..	Mr. D. F. Robertson, Manager, S. S. Agency, California Savings Bank, 4th & Spring Sts.
London ..	Branch Office, N. Y. K., 4 Lloyd Ave., London, E.C.
Liverpool ..	Messrs. F. A. Hodgkinson & Co., 24 Fenwick St.
Manchester ..	Messrs. F. A. Hodgkinson & Co.
Glasgow ..	Messrs. A. R. Brown McFarlane & Co.
Middlesborough ..	Messrs. T. A. Bulmer & Co.
Paris ..	Messrs. Chaplain, Cahen & Strauss, 30 Rue d'Enghien.
Marseilles ..	Mr. P. Young, 2 Place Sadi Carnot.
Havre ..	Messrs. Langstaff, Ehrenberg & Pollak, 67 Grand Quay.
Antwerp ..	Comptoir Maritime Anversois, 25 Jordanes Quay.
Rotterdam ..	Messrs. P. H. Van Ommeren.
Port Said ..	Messrs. Worms & Co.
Bombay ..	Branch Office, N. Y. K.
Calcutta ..	Messrs. Andrew Yule & Co.
Colombo ..	Messrs. Carson & Co.
Penang ..	Messrs. Boustead & Co.
Singapore ..	Messrs. Patersons Simons & Co.
Melbourne ..	Messrs. Dalgety & Co.
Sydney ..	Messrs. Burns, Philp & Co.
Manila ..	Messrs. Warner, Barnes & Co., Messrs. Erlanger & Galinger Co.
Honolulu ..	Messrs. Castle & Cooke, Ltd.
Hongkong ..	Branch Offices of N. Y. K., T. K. K., & O. S. K.
Shanghai ..	Branch Office, N. Y. K.
Vladivostok ..	Messrs. Hayashi Kaisoten, Kitaiskaia St. or any office of Messrs. Thos. Cook & Son.

## Formosa and Java Sugar

Java sugar prices have been falling since last spring, so that the present congestion is 18,000,000 piculs. The output of Java sugar last year was estimated at 23,500,000 piculs, and this year at about 30,000,000 piculs, which may be totaled at 3,100,000 tons. Considering the export from April last year through the month of September this year, there were 700,000 tons shipped to Great Britain, 80,000 tons to France, 30,000 tons to Port Said, 140,000 tons to Singapore, 210,000 tons to Hongkong, 95,000 tons to Japan, and 500,000 tons to India. The remainder thus is estimated at about 1,170,000 tons. The decrease of consumption and the dearth of tonnage will not allow the same amount of shipments to Great Britain as hitherto. The same will be seen in the exports to India. Figuring that an average export of 100,000 tons is made each month to the end of March next year, there still remains about 570,000 tons held over from the previous year.

The relations between Formosa and Java products are of so close a nature that a fall in the latter has an effect on the former. Thus this present crumbling state of Java sugar will influence badly the Formosa price next year. According to the present tendency, it is believed that the export price will be lower by over two yen, while the domestic price will decrease by over one yen. On the other hand, the cost of production has been increased this year by about Y.1.50, and the Taiwan firms are placed in a rather hard position. The firms are afraid to compete with the Java sugar. The recent discussion on the import of Java sugar to Japan was made the occasion of a protest by the firms, for it would have great influence of the sugar companies of Japan. Besides this question the rumor of a consumption tax on sugar is also unbalancing the sugar market and all branches of the sugar industry are conserving their resources as never before.



SOME OF CHINA'S ANCIENT BRONZE WHICH ESCAPED THE MELTING POT

## Chinese Copper Alloys\*

[By CHEN TEH YUEN, B.S., SOOCHOW UNIVERSITY]

Copper alloys are intimate mixtures of copper and one or more other metals, such as tin, zinc, and nickel. They are neither mechanical mixtures nor chemical compounds. Very frequently, they are solid solutions of one metal in another, or of a chemical compound of the metals in the metal which is in excess.

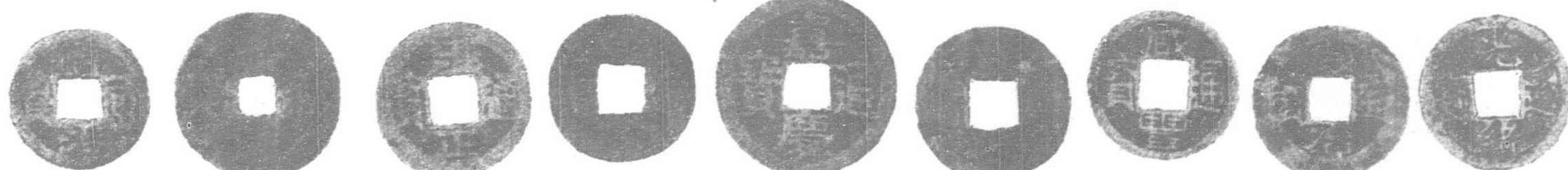
The principal Chinese copper alloys are: sound copper, yellow copper, white copper. They correspond respectively to bronze, brass, and German silver used in Western countries.

The exact date of the beginning of the Copper Age in our country has not yet been ascertained. From the fact that the Emperor Sheng Nung mined copper in the Seuen Hwan mountain for making vessels, we might infer that this age began probably earlier in China than in Europe, because he ruled from 2737 to 2697 B.C., while the time between 2500 and 1900 B.C. has been considered as the Copper and Stone Age in most of the European countries.

in Wen Ti's (179-157 B.C.) court, said: "The law permits people to mint coins by mixing copper and tin. If they debase the money with lead or iron, or by any other means, their faces shall be marked with black indelible ink for punishment. Their art of alloying the coin with inferior metals is quite skillful and the profit obtained therefrom is considerable."

Again, at that time, people began to make silver copper alloys. At Tai Yung a kind of fine copper was produced that was alloyed with silver and tin for making mirrors. These mirrors were very bright and reflective. The origin of "yellow copper" and "white copper" is not definitely known. Evidently they are not as old as bronze.

Although iron began to displace copper in making weapons and many other purposes after the dawn of the Iron Age, yet the increasing demand for making coins, images, and vessels of daily use has rendered us often in need of copper since the Han Dynasty. This gave rise to two bad effects, namely, the destroy-



CASH OF THE CHING DYNASTY ISSUED AT THE RATE OF MORE THAN TWO HUNDRED MILLIONS A YEAR BY MELTING BRONZE ANTIQUES

The Bronze Age began probably in the reign of Wang Ti (2697-2597 B.C.). Soo Zong believed that the hook of the crossbow made at that time contained tin in addition to copper. Then, it was made of bronze. Also, Wang Ti ordered his minister Che Peh to make several kinds of copper bells, which were probably made of bronze, or what we now call sound copper.

In the Chou Dynasty (1122-249 B.C.), bronzes of different compositions were made. The alloy for making bells and "tings" (two-eared and three-footed cuplike vessels) contained five parts of copper and one part of tin; for making hatchets, four parts of copper and one part of tin; lances and spears, three parts of copper and one part of tin; swords, two parts of copper and one part of tin; arrows, three parts of copper and two parts of tin; and mirrors, equal parts of these metals.

The art of making copper alloys was much improved in the Han Dynasty (206 B.C.-25 A.D.). Kea Nie, a young statesman

ing of ancient copper vessels and the prohibition of the use of copper for making vessels.

Our ancient copper vessels, such as bells and tripods (tings), have various shapes and names, which have no equivalents in English. Archaeologically they are exceedingly valuable because we can get much historical and etymological information from the inscriptions engraved thereon. Unfortunately most of these relics were destroyed from time to time principally owing to lack of copper. From historical records, we find that this sort of vandalism was committed altogether seven times by the Government in different dynasties. Of course, the antiquities destroyed by the common people in times of peace and war were also innumerable.

Tsin Shih Wang (249-210 B.C.) collected all the copper weapons and vessels from the people, remelted them and cast them into twelve metal men, each of which weighed 240,000 catties. This was the first disaster to befall these antiquities. Tung Cho, a disloyal minister in the Han Dynasty, destroyed all

\* Thesis Presented to the Faculty of Soochow University in Partial Fulfillment of the Requirements for the Degree of Master of Arts.

the copper objects at Chang An and Loh Yung for making small coins. (First year of Sha Ti, 190 A.D.) In the ninth year of Kao Wang (589 A.D.) in the Sui Dynasty, the Emperor destroyed three big bells and three drums that were obtained in overthrowing the Chen Dynasty. He later melted all the copper antiquities of the Chen Dynasty in the eleventh year of his reign (591 A.D.). In the second year of Heen Teh (955 A.D.), in the After Chou Dynasty, the Emperor She Tsung commanded that all kinds of copper images and vessels in the whole empire, with the exception of mirrors, weapons, vessels of public ownership, sacred vessels in the court, and musical instruments in the temples, should be destroyed and sent to the officials within fifty days. If any one secretly kept more than five catties of copper, he should receive the penalty of death! One ruler of the Kin Dynasty ordered the destruction of all the antiquities from Liao and Sung in the third year of Chin Lung (1157 A.D.). In the sixth year of Shaou Shen (1136 A.D.) of the Sung Dynasty the Government collected all the copper vessels from the people. In the twenty-eighth year of the reign of the same Emperor (1158 A.D.), the Government gave more than 1,500 copper vessels of the court to the mint and again extorted copper from the people with the result that more than two million catties were obtained. When the Emperor Chin Tsung was captured by the army of Kin in the second year of Tsing Kang (1127 A.D.) all precious vessels were carried with him. In the latter part of the Kin Dynasty, however, all of them were destroyed.

As to the prohibition of the use of copper vessels, it has been historically proved that such a policy has been no infrequently resorted to at different times up to the middle of the Ching Dynasty. In the third year of Hiao Kien (456 A.D.), the Emperor prohibited people from using copper in building vehicles and from using copper vessels in restaurants. In the Tang Dynasty (618-906 A.D.) similar action was taken from time to time. The Emperor Huan Tsung prohibited the secret selling of copper, lead, and tin, and the making of copper utensils (seventeenth year of Kae Yuen, 729 A.D.) Tai Tsung again forbade the making of copper vessels (seventh year of Dar Li, 772 A.D.) and Teh Tsung also prohibited the selling of daggers and copper vessels. He allowed people, however, to open copper mines on condition that they sell the copper to the Government excepting that used for making mirrors. Hien Tsung also prohibited the using of copper vessels in the first year of his reign, 806 A.D. The Emperor Kao Tsu of the After Tsin Dynasty forbade the making of copper vessels in the third year of Tien Fuh (938 A.D.). Kao Tsung, of the South Sung Dynasty, ordered that all copper vessels, either public or private, were to be sent to the mint. If any one refused to do so, he was to be punished. Even as late as the first part of the Tsin Dynasty this copper collecting policy was still carried out. In the third year of Yung Chang (1725 A.D.) an imperial proclamation was issued prohibiting the use of yellow copper vessels. The nobles, however, were allowed to use them. The families of those whose official rank was above the third degree had the honor of enjoying the use of this beautiful gold-like metal. On the other hand, those who were less noble, or the common people, were required to sell their copper to the Government within three years. The next year, this privilege was further limited to the families of the first official rank and the people were allowed to use copper for paying taxes. In the first year of Kien Lung (1736 A.D.), this policy of prohibition was abandoned following the advice of Hae Wang, the minister of Finance at that time.

All this collecting and destroying of copper vessels indicate that the copper mining industry has not been properly developed. This has been due to a lack of scientific knowledge together with other various causes. There is no doubt that in such a large territory as China, there must be rich copper mines, extensive enough to supply, at least her own demands.

The methods used in the metallurgy of copper are naturally very primitive. Nevertheless, no matter how primitive the methods may be, the principles involved in the processes must be scientific, at least, to a certain extent, and, therefore, worthy of study. Many scientific methods of modern industries are based upon or derived from primitive methods of ancient times. In those early times, charcoal was probably used for smelting copper. Kea Nie of the Han Dynasty, in describing nature's influences on material

things, said, "Nature is charcoal and all things are copper." The furnace used was probably a kind of primitive blast furnace resembling those used now in local shops, which will be described later.

The following quotations from different authorities will enable us to know something about the old methods for smelting and alloying copper. Though brief and incomplete, yet it gives us some idea of what our forefathers accomplished in this branch of metallurgical industry. Owing to the lack of scientific records and the neglect of material things by our ancient literary scholars, there is no doubt that these statements found here and there in their obscure writings reveal only a small fraction of the knowledge of our ancient people. In spite of his limited knowledge of metallurgy, the writer will try to make some possible explanations concerning these statements translated below.

"The copper from the mountains is usually contaminated with clay and stone. It is obtained by digging into the ground several scores of feet deep. It is covered with a stony matrix called gangue. All over the surface of the gangue, there are copper spots from which copper may be recovered after smelting. So, it is unlike the gangue of the silver ore, which is useless. The particles of the copper sand in the mine have various shapes, some are large, some are small, some are bright and some are opaque. After washing out the sand and clay, the ore is charged into the furnace to be smelted. The copper melts and flows out and is known as native copper."

"There are different kinds of copper ores. Some contain copper only, being free from lead and silver. From this kind of ore, copper is obtained simply by smelting in the furnace. The furnace for smelting copper containing lead has two openings, one situated near the bottom and one near the top. The lead melts first and flows out at the upper hole; after a while, the copper melts and flows out from the lower one (?). The copper ores from the foreigners of the East (Japan or Korea) contain silver. When it is melted in the furnace, silver flows on the top and copper sinks to the bottom."

The above quotations do not indicate what kind of flux was used in the smelting of the copper. But some flux must have been used since the latter invariably contains some silica. According to modern practice, either lime or the slag from an iron-melting furnace containing ferric oxide is used to combine with the silica, which is removed from the furnace as slag.

When two or more metals are melted together, the lighter one always floats at the top and the heavier one sinks to the bottom. Since the specific gravities of lead and silver are greater than that of copper, it is impossible that lead and silver should float on the surface and copper sink to the bottom. A flux, however, might have been used that would combine with the lead or the silver only, forming a material lighter than copper. In consequence, they would float on top.

"Copper finds many uses in the world. Either from the mountain or from the furnace, we obtain only red copper. When mixed with smithsonite and 'Japanese lead' the color is changed and it is converted into 'yellow copper' (brass). If melted with white arsenic and many other reagents, we obtain 'white copper.' Melting with alum and nitre converts it into 'green copper'; alloying with tin changes it into 'sound copper' (bronze); and mixing with Japanese lead (zinc) yields 'wrought copper.' The 'red copper' is the basic substance from which we make these alloys."

The statements quoted above indicate that it was known that what was called "red copper" was the real copper, though the term copper has been used indiscriminately for all copper alloys. "Yellow copper" corresponds exactly to the brass manufactured in foreign countries. It is an alloy of copper and zinc. So it is made by mixing copper and smithsonite or Japanese lead (zinc). The making of "white copper" by alloying copper with arsenious oxide is doubtful, as the "white copper" we obtain at present is very similar to German silver which contains principally copper, zinc, nickel, and a small amount of iron. It may be that this is a misstatement, or a confusion of terminology; or it may be that this kind of copper arsenic alloy was actually made in ancient times. In our ancient literature, the term "green copper" frequently occurs. It was said that "green copper" from Persia could be used for making mirrors. This may have been a special

kind of alloy, but the writer has not been able to get hold of a sample of it and does not know what its character is. According to one shopkeeper in this city, however, "green copper" is simply a kind of brass. Indeed, if the percentage of zinc in the brass is high, or, if some other metal is present as an impurity, it might make the color lighter or slightly greenish in appearance. Considering that alum is added, it may be somewhat similar to aluminum bronze. The purpose of adding nitre is not known. What the ancient people called nitre may include something other than potassium nitrate.

"In order to convert the 'red copper' into the yellow variety for hammering and forging purposes, one hundred catties of self-blown coal\* are put into the furnace and set on fire. Then an earthen crucible charged with ten catties of copper and six catties of smithsonite is put into the furnace. Some prefer to use Japanese lead (zinc) in place of smithsonite, because the latter gives rise to too much gas and thus causes some loss. In this case, six catties of 'red copper' and four catties of Japanese lead (zinc) are successively charged into the crucible, the contents allowed to melt, and, after cooling, the 'yellow copper' thus formed is taken out. Now, it is ready for making utensils or instruments.

"If one wishes to use copper for making musical instruments, it should be mixed with lead-free tin produced in Canton. For gongs and copper drums, the alloy is made of eight catties of 'red copper' and two catties of Canton tin. For bells, it should be further refined. Inferior vessels are made of a kind of copper alloy containing equal parts of 'red copper' and Japanese lead (zinc), or, even four parts of the former and six parts of the latter."

The fusing of copper with smithsonite for brass-making, as mentioned above, is, of course, not satisfactory. The mineral contains more or less impurities that are sure to be introduced into the alloy. Moreover, the evolution of too much gas is also objectionable, as was realized by these ancient workers. The smithsonite, after being deprived of carbon dioxide gas is probably reduced to metallic zinc by the coal mixed with the charge in the crucible.

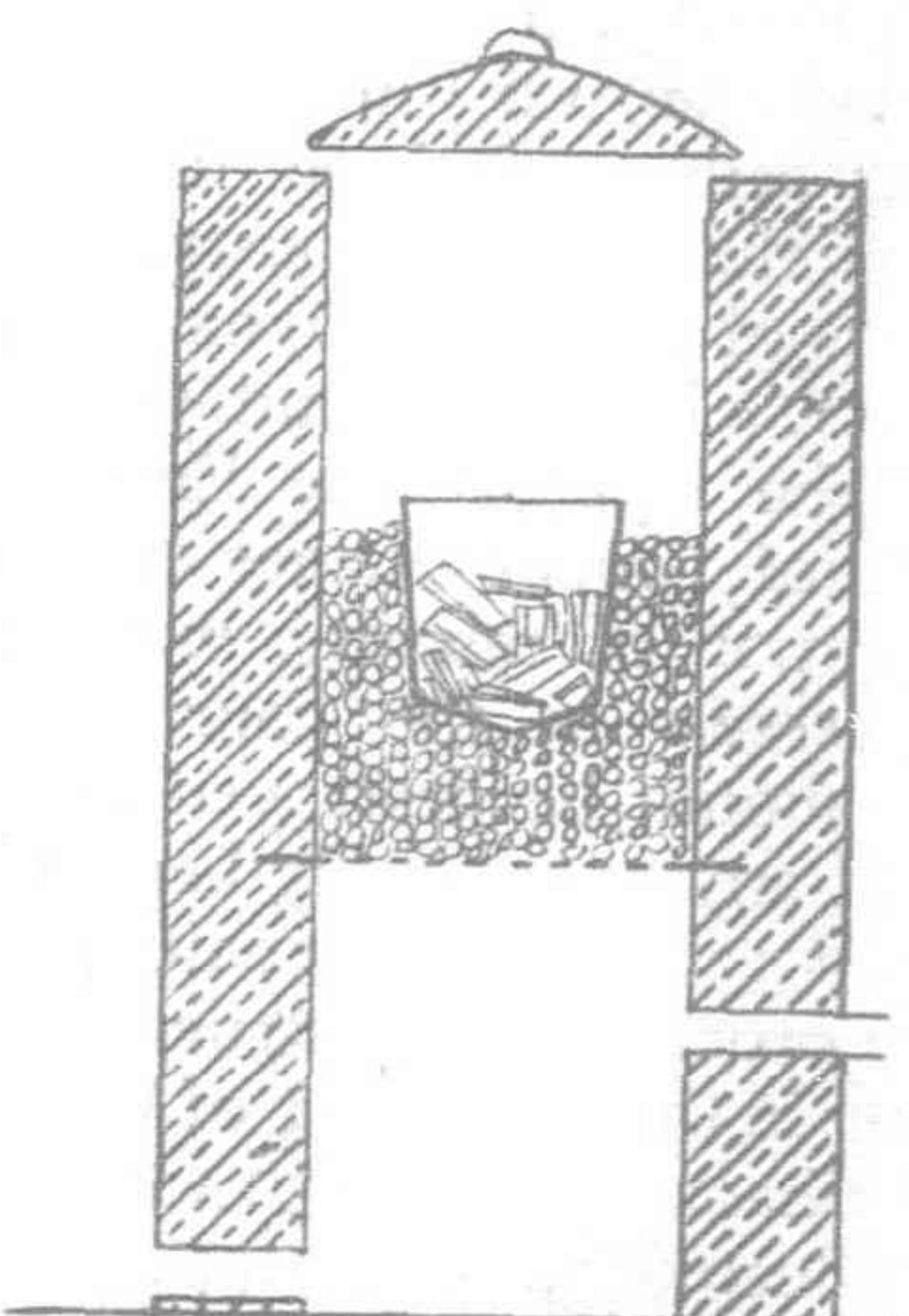
Furnaces of large dimensions for copper smelting were built as far back as the fifth century A.D., if not earlier. In the seventh year of Yung Ming (489 A.D.), Lu Tseuen advised Wu Ti of the South Zee Kingdom to open the copper mine at Mong Shan. He said that there were four furnaces at Mong Shan, each of which was ten Chinese feet high and fifteen Chinese feet deep.

The descriptions quoted above show that the metallurgy of copper had been considerably developed in those early times. Nevertheless, this art, like all other industrial processes, has not been improved since its discovery. Chinese coppersmiths are still using the methods and implements that were handed down from our remotest ancestors. This has been proved by visiting some local shops in the City of Soochow. In one of these shops, a furnace for remelting copper was observed in operation. The furnace was about three feet high, six feet wide, and five feet deep. It was rectangular in shape and was built of bricks and mortar. In the middle of the top, there were two holes about  $1\frac{1}{2}$  feet square. Into these holes, coal was charged and crucibles were introduced. On one side of the furnace was attached a hand bellows, which was constantly operated by a laborer. The crucible was dirty white in color, made of a special kind of clay, and was handled with long iron tongs. It was about  $1\frac{1}{2}$  feet high, the diameter at the top was about ten inches and, at the bottom, eight inches. Scraps of old "yellow copper" vessels were charged into the crucible. After melting, the crucible was taken out, the contents of it were poured into the moulds whereby square sheets of the alloy were obtained. The moulds were made of a kind of earth, and were about fifteen inches on each side.

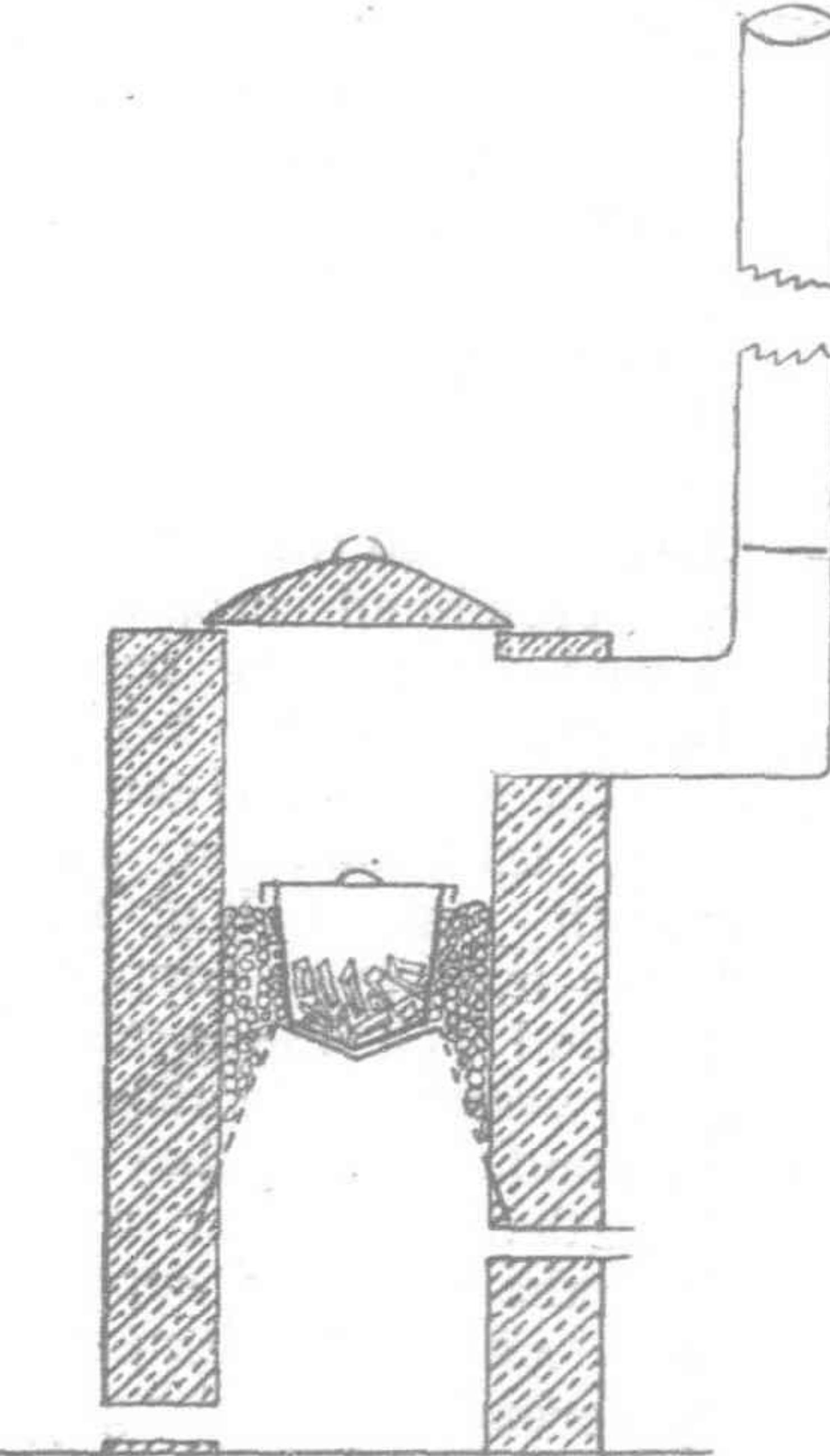
In another shop, "white copper" was in preparation. The raw materials used were "red copper," zinc, and nickel. They were melted in a crucible heated in a blast furnace essentially similar to the one described above. The shopkeeper said that, for the best grade of alloy, two catties<sup>†</sup> of copper, one catty

of zinc, and one catty of nickel were used, and for an inferior grade, three catties of copper,  $1\frac{1}{2}$  catties of zinc, and one catty of nickel were used. The higher the percentage of nickel, the better the grade. At present, scraps of copper and zinc are used, because it is commercially more profitable than to use new materials. The nickel used was said to have been imported from Austria before the outbreak of the European War. Since then, Japanese nickel has been used to a certain extent.

The furnace in that shop was circular and built of brick and clay, covered with a thin sheet of iron. It was  $2\frac{1}{2}$  feet high; its outside diameter was  $1\frac{1}{2}$  feet, and its inside diameter was ten inches. About one foot from the bottom, there were firebars for holding the fuel, beneath which there was an ash pit. Two holes were bored through the wall of the furnace, one opened to the ash pit for removing ashes, and another, higher than this, was connected with a hand bellows, which furnished the blast. The ash hole was closed with earth while the furnace was in operation. At the top of the furnace there was no other opening for conducting away the products of combustion. For this reason, the furnace was always only partially covered. The furnace described above can hold one crucible only. It is diagrammatically shown here.



CRUCIBLE FURNACE USED FOR BRASS MELTING



MODIFIED FURNACE SUGGESTED BY THE WRITER

The crucible used was made of Nieshen clay and was pinkish in color. It was six inches high, five inches in diameter, and three tenths of an inch thick. Its bottom was slightly conical instead of flat. The crucible can hold six catties of the charge. The fuel they were using was anthracite coal from Honan province. After the fire had been started in the furnace and weighed amounts of copper and nickel had been charged into the crucible it was introduced into the furnace with iron tongs. The crucible was so buried in the burning coal that the sides and bottom were uniformly heated. Then the top of the furnace was partially covered, the ash hole was closed, and the hand bellows was operated continuously. After the contents of the crucible melted, the weighed amount of zinc was then added. On account of its volatility, zinc was not charged into the crucible along with the other metals. All these raw materials used were in the form of large pieces or lumps. The workman occasionally stirred the contents of the crucible with an iron rod so as to insure a homogeneous mixture. At the end of about one hour the operation was complete. The end point was recognized by the experienced eye of the workman.

Then he prepared an iron mould and wiped it with some rapeseed oil. He loosened the crucible from the coal with the iron stirrer, took it out with the iron tongs, put it on a piece of iron provided for this purpose, and skimmed off the scum from the surface of the molten alloy with the stirrer. The large part of the scum was white and was probably zinc oxide. The contents of the crucible now emitted a dazzling white light. After the scum was completely removed and the molten alloy was

\*This coal is first pulverized and made into cakes. It is said that it will continue to burn day and night.

†A catty equals  $1\frac{1}{3}$  pounds.

dull red in color, it was carefully poured into the mould from which the ingot was taken out after cooling. It was  $2\frac{1}{2}$  feet long,  $1\frac{1}{2}$  inches wide, and one inch thick. The loss of metal during the operation was about ten per cent.

Now the crucible was ready for another charge. Copper and nickel were put into it as before, zinc being added afterwards. After again introducing the crucible into the furnace, one large lump of coal was charged into the furnace from the top. A considerable amount of coal invariably fell into the crucible. The operator said that he did not intentionally add coal to the contents of the crucible, but that it was unavoidable, on account of the construction of the furnace. Of course, so brief a study would not enable us to draw any positive conclusions concerning the processes and the apparatus used in preparing the alloy. It seems, however, that certain changes in the apparatus and the process might be made which would improve the product and lessen the waste.

The furnace might be provided with a chimney of sufficiently large area and height to produce a good draught. Two dampers, one in the chimney for controlling the outflow of the gaseous products of combustion, and another at the ash pit opening for controlling the inflow of air, are also indispensable (see Fig. 2). By these means, the workman could keep the rate of combustion under better control without continuously using the hand bellows. The grate or iron bars might be replaced by a perforated truncated cone of suitable dimensions, so as to let the crucible sit directly on the cone and not sink down as the fuel is consumed (see Fig. 2). This improvement has recently been introduced by Messrs. Weir, of Catheart, Glasgow. The resulting advantages are:—Greatly increased speed of melting; consumption of fuel greatly reduced; and labor cost considerably lowered.

To use coke is probably better than to use anthracite coal, if the price is not too high. It is always used in crucible furnaces in foreign countries. Before being charged into the crucible, the metals should be reduced to a fine state of division, or, if this could not be economically done, disintegrated into small pieces. As the aim of making an alloy is to secure a homogeneous mixture, the finer the materials are, the better the alloy will be. Moreover, fine materials probably would consume less coal during the melting.

The addition of zinc after the fusion of other metals is scientific, because it is very volatile and the melting point of nickel is very high. This reduces the loss of zinc considerably. According to my observation, however, large quantities were still lost as fumes and as oxide in the scum. One possible remedy for this is first to make two alloys, one copper-zinc alloy and another copper-nickel alloy. They may be cast into ingots of suitable form and the zinc alloy may be broken into pieces. A

required amount of the less fusible alloy, i.e., the copper-nickel alloy, should be melted first, and the more fusible copper-zinc alloy stirred in afterwards exactly in the same way as the zinc is added now. This operation would also improve the quality of the alloy, because remelting gives a better chance for the entangled oxides to rise. Of course, the making of two alloys and then combining into one would probably involve more fuel and labor. Whether it would be commercially profitable would depend on the price of zinc and fuel, and the wages of the workmen.

As described above, when the crucible was taken out of the furnace, it was put on a piece of iron provided for this purpose. The life of the crucible is certainly endangered because it is suddenly chilled in contact with the cold iron. A piece of fire clay or brick, which conduct heat badly, will be much more suitable for this purpose.

The molten metals should always be covered with a layer of pure powdered charcoal to prevent oxidation. Although the coal falling into the crucible while charging serves this purpose temporarily, the amount added is very irregular and is probably soon consumed. Besides, the impurities in the coal would be introduced into the alloy, and, only materials of known purity should be used for this purpose. The crucible should be provided with a lid so that it might be covered while charging the fuel or at any other time.

Just before pouring the molten metal into the mould, the contents of the crucible should be vigorously stirred with the iron rod so as to prevent segregation. This seems to have been neglected by the workmen as I observed their work.

The oiling of the mould is very desirable, because it not only makes possible the easy separation of the ingot from the mould, but also reduces the film of the oxide that envelops the stream of the metal when it is poured. But the temperature should be sufficiently high to enable the burning oil to accomplish this work.

In order to reduce the dissolved oxides, minute quantities of aluminum, manganese, phosphorus, or other easily oxidizable elements may be added to the molten metal. As a rule, a molten metal will dissolve its own oxide to a small extent, but will not dissolve oxides of other metals.

Of course, we can directly copy Western methods and use modern apparatus in manufacturing these alloys. But, in this Age of Industrial Revolution in China, it is also very important to reform these old industries by applying scientific principles. Immediate overthrowing of the old industries and replacing them by new ones may not be profitable, if it is practicable, under present economical conditions. It demands the investment of large amounts of capital and would cause labor troubles. Progressiveness without radicalism is the proper way to save the nation industrially as well as politically.

(To Be Concluded in April Number)

## Floods and Flood Prevention\*

[By HERBERT CHATLEY, D.S.C. (ENG.), LONDON; MEM. INST. C.E. (IRE.) ENGINEERING DEPARTMENT, WHANGPOO  
CONSERVANCY BOARD]

In view of the extraordinary importance that floods have in China, no excuse is needed for treating of the subject. In regard to experience of floods in China the writer has seen a few relatively small floods in northern Chihli, southern Anhwei and southwestern Kiangsu, but by favor of the Engineer-in-Chief of the Whangpoo Conservancy Board he has been able to make use of the records of that Board and has also endeavored to render himself familiar with the available literature on the question.

*Origin of Floods.*—In almost all cases except in coastal area, floods are due to excessive rainfall in which the storage and discharging capacity of the drainage channels are insufficient.

It is not necessarily the case that the rainfall occurs on the flooded area since (as at the junction of the Siang and Kan rivers and also at Wuhu, on the Yangtze) the mere backing up of the main stream can cause floods. Disregarding tidal and typhonic floods for the time being, we must then lay emphasis on two lines of thought:

- (a) The intensity and extent of rainfall.
- (b) The storage and discharging capacity of a river.

\* Address delivered before the Shanghai Engineering Society.

*Record Rainfalls.*—Exact meteorological records for long periods are sadly lacking in China but at Zikawei, Peking, and Hongkong some thirty years have been studied.

Interval	Value	Place
1 year	905.1 ins.	Cherrapungi, India
72 hours	61.58 "	Tanabe, Japan, Aug., 1889
48 "	50.79 "	"
24 "	40.80 "	Cherrapungi, India "
1 hour	11.50 "	Champo, California, Aug., 1891
5 min.	1.00 "	Tampa, Florida

According to Talbot, the ordinary maximum rate which may occur once in fifteen years is

$$\text{inches per hour} \quad \frac{180}{\text{time in min.} - 30} \quad (\text{times insert exceed 1 hour})$$

Once in forty years, a value twice as much may occur. According to the Zikawei analysis the following are the records in China for eleven years:

Interval	Value	Place
1 year	2,760 mm. = 108.7 ins.	Samshui
1 month	953 mm. = 37.5 "	Pakhoi
1 day	319 mm. = 12.6 "	Pakhoi (June 27, 1903)

The Zikawei records for nearly forty years are:

Interval	Value
1 year	1,439 mm. = 56.7 ins.
1 month	325 mm. = 12.8 "
1 day	136 mm. = 5.34 "

(Some typical 1 day records are:—Kilung 13.39 ins., Gutzlaff 6.00 in., Weihaiwei 5.40 ins., Chefoo 3.13 ins., Tientsin 2.82 ins., Mokpho 7.88 ins.)

The annual value is only of importance in regard to lakes or streams having enormous capacity. In such cases the levels will depend mainly on seasonal changes rather than short period ones. The North American lakes give an example of this kind.

Probably the most important rate is the mean during a storm period (rarely more than five days) but due regard must be had to the residual effects of a previous storm.

A typical severe storm was that of March 24-27, 1913, in the middle region of the United States. The highest local intensities at one spot were as follows:

7 ins. in 1 day	(March 25)
9 " " 2 days	( " 24-25)
9½ " " 3 "	( " 24-26)
10½ " " 4 "	( " 23-26)
11½ " " 5 "	( " 23-27)

These were only of small extent. In the whole storm the average depth of precipitation was as follows for the whole five days:

9.75 ins. over 10,000 sq. miles
8.20 " " 50,000 "
6.90 " " 100,000 "
about 2.00 " " the whole area of some 500,000 sq. miles.

The frequency of such great storms is not well determined but it is computed that on an area of 12,000 sq. miles in Indiana and Ohio once in 90 years the total precipitation over the whole area in 6 days may amount to 9.3 ins., and once in 30 years may amount to 8 ins., while 6 ins. may occur once in 9 years.

How far such figures can be applied in China is doubtful but it seems clear that while cloud systems may have an area of several hundred thousand square miles the mean intensity over a large area is not likely to exceed one inch per day during the storm period.

*Restrictions on Discharge.*—The quantity that can be discharged from a certain area without flooding depends on the sectional areas of channel available and the slope. There are no simple rules that can be used, but the Chezy formula gives a general idea of the relationship. Using English units and allowing for considerable resistance due to bends, contractions, etc., we may say very roughly that

$$\text{mean velocity} = 100 \sqrt{\frac{\text{sectional area of water}}{\text{Profile of bottom}}} \times \text{slope}$$

By juggling with this formula certain relations may be established which tend to be true in the average but must be carefully scrutinized in any particular case. Thus if we assume the channels are V-shaped, with side slopes of angle  $\Phi$ , with the horizontal the above formula can be written

$$V = 100 \sqrt{\frac{D I}{2 \sec. \Phi}}$$

where D is the central depth of the water and I is the slope, and the discharge

$$Q = 100. D^2 \cot \Phi \sqrt{\frac{D I}{2 \sec. \Phi}}$$

In other words with geometrically similar channels

- (a) With constant slope, the discharge varies as the two-and-one-half power of the depth, and
- (b) With constant depth, the discharge varies as the square root of the slope.

*Example*—To carry off in a previously dry channel a storm with a mean fall of one inch per day extending over 100,000 sq. statute miles, the channel has to discharge a quantity of

$$\frac{1 \times 2,323,200 \times 100,000}{3,600 \times 24} = \text{about } 3,000,000 \text{ cu. ft. per sec.}$$

If the slope is 1 in 30,000 and the side slopes 1 in 10, according to the formula the central depth at the mouth must be nearly 225 ft. and the width is 4,500 ft. Approximately speaking, the width may be increased several times and the central depth decreased in the same ratio without affecting the result, but this ratio chiefly depends on the consistency of the soil.\* Depths such as 225 ft. rarely occur in rivers although they are to be found in the Yangtze Gorges.

This example, which gives a precipitation area much less than that of the watersheds of the Yangtze or the Yellow River and a by no means exceptional rainfall intensity, shows how severely the drainage channels are strained by heavy rainfall.

*Rise of Level in Streams*—The procedure when the feed exceeds the exhaust is somewhat as follows: The incoming water causes the water to rise and at any section the discharge increases because the cross section enlarges. The mean velocity also grows with the depth, still further increasing the discharge, and if these changes do not prove sufficient the surface slope grows and with it the velocity and discharge until equilibrium is reached in one or more of the following conditions:

- (1) Large slope.
- (2) Great depth.
- (3) Rapid erosion of section, causing increased width.

In soft soil the last factor places a limit on the velocity although of course a time element enters.

In regard to floods (1) and (2) are most important since desirable increase of depth is limited by the dike or bank level and large slope means proportionately still greater increases of depth farther upstream.

*Flood Conditions.*—As the depths increase, the widths also increase but owing to the small slope and the inertia of water the effective increase of area is not always proportionate to the actual increase. In other words the shallow water on the side terraces is often dead. Rating curves for certain points can be plotted showing discharge in terms of water level but the slopes must be considered, although it may be asserted without great error that to a certain discharge (within small limits of variation) there is a prescribed water level. As soon as this rises to the bank the adjacent country is flooded and this is, in China, the most usual cause of floods. In certain areas in the great plain and other flat places, floods may also occur owing to partial or entire absence of drainage channels, but this does not call for consideration since there is, obviously, only one remedy, viz., drain the land by cutting channels.

Seeing that local intensities of five inches per day over small areas and one inch per day over very large areas not infrequent

\* Sections tend to be parabolic segments rather than triangles. The side slopes of the Yangtze near the mouth are as small as one in 20 or less.

occur, it is obvious that unless ample section is allowed in the channels, flooding is bound to occur and the next question that arises is, How great will the floods extend and how long will the water stand? As soon as the bank levels are reached, in flat country the water can spread indefinitely but no great increase of discharge section occurs and also, in such country, great water slopes in the channel cannot develop. On the other hand, intense rainfall rarely lasts without interruption for more than a week and if there is large water surface exposed for a long time evaporation is also an important factor. Speaking broadly, it rarely happens that the discharge occurs at as rapid a rate as the maximum mean precipitation over a watershed in the lower channels, and it is not really necessary that it should, since the channel has usually a very considerable storage capacity below the level of the agricultural land, and the rain not being simultaneous at all parts of the watershed, the available period for discharge is longer than that of the rainfall. It is, however, quite possible for a discharge rate of 50% or so of the maximum daily precipitation rate over the whole basin to be necessary to avoid flooding.

*Rainfall Losses.*—Evaporation is important in regard to the mean ratio of run-off to discharge for long periods of time. Zikawei records (1874-1915) show that the average annual evaporation in the shade is 826 mm. or 32.6 ins. In the sunshine there is no doubt a wet surface (especially if there are currents in it and there is wind) loses quite as much as the annual rainfall, as is the case on the ocean. Floods occur, however, in China usually in the summer when humidity is high and the evaporation is rather below the maximum, and rate of evaporation per day in the shade rarely exceeds three millimeters (say one eighth of an inch) so that even in a month the effect may not exceed four or five inches.

*Flood Records.*—Much useful data can be found in Chinese prefectoral and temple records. The latter have, in the writer's experience, frequently proved most serviceable in establishing maximum flood levels. Unfortunately, however, until the flood areas have been properly surveyed it is impossible to say where the flood contours will lie. The prefectoral records of the various "hsiens" will, however, show how frequently floods have occurred at various points to an extent sufficient to affect life and property and a statistical discussion of these would probably be valuable for any one locality.

*Capacity of a Channel.*—The capacity of a channel may be very considerable. Thus the Yangtze for at least 2,000 miles has an annual variation of level of more than 20 ft. over an average width of more than one mile and this could take care of over 1 million million cu. ft. There are in addition large lake areas as in the Tungting, Poyang, and Wuhu lakes, with a total area of about the same as that of the river, approximately doubling the capacity and giving a total of upwards of 5 per cent of the total annual precipitation on the whole basin. Except in those cases where a channel is artificially defined (as by dikes) the maximum capacity is difficult to estimate, and in a large watershed it is obviously possible for floods to occur in the basin of one tributary, while the main channel is not fully charged, although in such cases the floods will probably be of short duration. In the Yangtze, for example, it will be found that the highest flood levels are not simultaneous, as the following table will show:

Period	Place	Rise	Date
1892-1908	Chungking	117 ft. above zero	Aug. 12, 1908
1877-1910	Ichang	58 "	Sept. 15, 1902
1868-1910	Hankow	50½ "	July 23, 1870
1871-1912	Kiukiang	45 "	" 21, 1901
1897-1911	Wuhu	30 "	" 10, 1911

Similarly the writer found that the flood level in certain parts of the lake areas near Wuhu, although in most parts a maximum in July, 1911, was actually higher in 1914 at many points, owing to local freshets.

*Remedies.*—There are several remedies for floods:

(1) *Raising the Land Above Maximum Recorded Flood Level.*

This is of course efficacious but most expensive, and if carried on very widely may intensify floods on other areas. It has been proposed for the Yellow River in a special form, the idea being to inclose

certain areas and deliberately flood them and rely on the silt to build them up to the high water level.

(2) *Diking to Above Maximum Flood Level.*

This is the most usual means and is efficacious within certain limits. There is grave danger of the dikes being undermined at concaves in the river bed and the direct rainfall on the protected areas cannot be removed during high river except by pumping. The definition that diking gives to the river channel is a great help in maintaining depths, but on the other hand, unless the dikes are well separated, a heavily charged river may build up its bed between the dikes so that the water overtops them. Whether this is peculiar to the Yellow River and arises from some extraordinary cause is a matter of controversy.

(3) *Deepening the Channels.*

In combination with No. 1 this may be satisfactory if compatible with gradient, but in silt laden rivers it is not easy to proceed with the work faster than the deposition occurs. It is also difficult, expensive, and uncertain. Some engineers consider that it is the best and only permanent means of training since the water tends to follow the cut and maintain and deepen it. Others pin their faith to the dike system. Probably the fact is that each has its own particular merits and demerits and suits special cases. A most important point is that each river tends to have a fairly constant or uniformly increasing sectional area determined by the maximum velocity and the material, and unless it is reclaimed at the sides simultaneously with the deepening of the channel, an unstable régime is produced that needs continual attention.

(4) *Damming Stream to Form Upper Area Storage Basin.*

It not infrequently happens that the agricultural or mineral value of the land in the hilly parts of a watershed is small and that by barring the stream with a moderately high dam, a large lake area can be produced. This may be drained during a dry period by sluices or, in some cases, evaporation may be relied on to reduce it. In order, however, that this method shall be really efficacious the reservoir should be empty before a storm. For this reason it is somewhat difficult to combine hydraulic power production with flood reservoirs.

(5) *Overflow Channels.*

Overflow channels may occasionally be usefully employed. In order that they should not cause deterioration of the main channel, these should only operate over high level weirs. The Wei River (Grand Canal between Lin Ching Chou and Tientsin) is supposed to be assisted in this way by outflows to the sea, but apparently the channels are choked or the weir openings too narrow.

(6) *Afforestation.*

There is little doubt that the deforestation of Northern China has appreciably increased the frequency and intensity of floods. Forests transpire a large proportion of the rain that falls on them and also retain much moisture. In addition they break the force of the rain, their roots bind the soil, and they mitigate the violence of mountain torrents by obstructing the channels. They also modify the rainfall to some extent by the temperature differences due to their chemical activity and the absorption of sunlight. The cultivation of forests on bare hills is therefore a palliative for floods if sufficiently extensive.

(7) *Simple Training.*

The regular processes of so called "conservancy" or "regulation" do tend to ameliorate flood conditions. The rectification of sharp bends by cut-offs, the fixing of "normal" lines with smooth trace, the closing of bayous, all tend to regularize the gradients and therefore the velocity and discharging

capacity of a channel, but the method is generally too indirect to be regarded as a definite and sufficient means of flood prevention, without diking. Where, however, there is a diked channel such as that of the Yellow River, the regulation of that channel is an absolute necessity if trouble is to be permanently avoided. Thus by the use of small groynes the motion of a loop in the channel may be arrested or diverted so as to prevent it from undercutting the dikes.

Still more important is the fact that a well designed channel or rather a well modified natural channel has considerable stability of régime so that the depths, water levels, and gradients, are easier to maintain throughout than they would be at any one point in an unregulated stream.

#### (8) Pumping.

The artificial increase of gradients by the introduction of pumping stations is a possibility, but it can rarely happen that it is economically feasible with a large stream, however useful it may be in towns.

*Tidal and Typhonic Floods.*—The river deltas of central and southern China are particularly liable to sea floods owing to a combination of maximum rainfall, high tides, and typhoon conditions in the summer. The spring tide range varies from 6 ft. or so off the coast of Kwangtung to about 22 ft. off Wenchow, diminishes again to about 14 ft. off the Yangtze and remains about this value in the Gulf of Chihli. The largest individual tides occur when the sun is not far from the equator and the moon has maximum declination, a condition that occurs in July. Typhoon conditions occur between June and September. The paths of the typhoons are generally such that they enter the coast between Canton and Wenchow, turn northeast and run parallel to the coast and emerge again near the mouth of the Yangtze. The wind rotates spirally anti-clockwise so that in the case of the Yangtze, if the center of the typhoon is to the left (west) of Shanghai, the sea will be forced into the mouth and heap up considerably. Chinese records show that Tsungming Island has been time and again flooded in this way. The sea walls, which are the only protection, are raised to about 24 ft. above L. L. W. at Yangtze Cape and even at Shanghai it is necessary to raise the bund to a level some 15 ft. above lowest low water.

#### EXAMPLES

*Floods near Shanghai.*—The highest recorded typhoon flood level in the Whangpoo in recent years is that of September, 1905, when the water at Woosung rose to over 18 ft. above the Woosung zero. Twice in 19 years (1892 to 1910) it exceeded 17.5 ft., and thrice it exceeded 16.5 ft. Every year it exceeds 14.5 ft. at least once. The land behind the dikes is in most places only about 12 ft. above the Woosung datum so that in the absence of dikes, floods would occur frequently, and the prefectoral records mention many instances of flood with severe loss. The determining factor in the natural level of the soil appears to be the mean spring tide high water level above which naturally silt would rarely be deposited. There are massive dikes along the Yangtze and the sea coast that appear adequate and the processes of canalizing, agriculture, building, and burial have raised many localities to a fairly safe level, but the danger of a serious sea flood is by no means non-existent.

*Tientsin Floods.*—In view of this question being at the moment *sub-judice*, little comment can be made, but it seems permissible to remark that the waterways at Tientsin are quite inadequate to serve the enormous watershed that tends to drain through them and that by-passes of some kind are absolutely necessary.

*Canton Floods.*—Captain Olivecrona has reported at considerable length on this question and it seems clear that more scientific and better maintained diking is necessary. It should be remarked in this connection that the rainfall in the Kwangtung province considerably exceeds all other parts of China and averages upwards of sixty per cent more than that of Shanghai.

*The Yellow River.*—This is the example *par excellence* of flood trouble and is far too big a subject to be tackled as a sub-heading in a short paper. Suffice it to say that a study of the old mouth appears to show definitely that this river can in course of

time build up a bed whose bottom is higher than the plain, and that although the present channel seems as stable at the moment as can be expected in a river whose silt content may rise to eight per cent by weight a catastrophe may occur any year. A complete survey of this mighty stream from Honanfu downwards together with contours over all the plain is absolutely necessary before any final opinions can be pronounced. The only serious data for any discussion are those in Capt. Tyler's well-known paper and in the 1890 report of a Dutch Society of Engineers. The profiles of the Kin-Han and Tsin-pu Railways would also be helpful.

The Dutch report, which seems to be little known, while not conclusive, arrives at certain results:

- a.—That the silt content rarely falls below 3,000 parts per million (0.3 per cent).
- b.—The grade in the plain averages about 1 in 5,000 and the velocities can therefore be made sufficient for the maintenance of a proper channel.
- c.—The present methods of maintenance are quite inadequate.
- d.—The chance of danger and the cost of prevention grow year by year.
- e.—With the proper data the river can be regulated without prohibitive expense.
- f.—The mouth can be regulated by tidal currents.

The writer's principal object is to draw attention to the technical aspects of the flood question in China, and hopes that discussion may bring out some further features. He cannot, however, but realize that the chief difficulty is the lack of mechanism for coördinated and persistent public action. If Chinese and foreign politicians and publicists can solve this aspect of the matter, there need be no lack of technical assistance. Without wishing to be didactic, it seems in his opinion that many of these large questions are difficult not so much because of any obscurity as to the cause of trouble as from the absence of concerted public will.

## Japanese Enterprise in China

Japan is now suffering from a glut of unemployed money which may be profitably utilized in Chinese enterprises, according to Mr. Kyoroku Yamanari, Director of the Taiwan Bank, in the "National Economic" columns of the Kokumin. China has a population of some four hundred millions, of which seven per cent are agriculturists. Agriculture being unsuitable for the accumulation of capital, large enterprises in China are generally started with funds introduced from abroad. Not only is the foreign capital introduced but also the work itself is conducted by foreigners, says Mr. Yamanari. In this respect the Europeans go ahead of the Japanese. According to an investigation by the Foreign Office, the Japanese merchants who do business of above Y. 50,000 in one year are 78 in number at Shanghai; of whom 11 do a business of above a million yen, 12 above half a million, 9 above Y. 200,000, 17 above Y. 100,000, 9 above Y. 70,000, and 20 above Y. 50,000. But, of these, only 8 are said to be doing a good business, the other commercial houses carrying on their business indifferently or incurring loss in their business. It therefore follows that the Japanese are as highly successful in business as the Europeans among the Chinese.

But, as entrepreneurs in China, says Mr. Yamanari, the Japanese are better qualified than the Westerners. All European houses are presided over by a few foreigners, the lower posts being occupied in the main by Chinese. The expense prevents the employment of many European clerks, and the use of a number of Chinese clerks presided over by a handful of foreign chiefs much detracts from the efficient working of the business. The Japanese houses, on the contrary, can bring many Japanese employees very easily from their own country, and in this point the Japanese stand in a better position than the European. Mr. Yamanari urges our capitalists to make a tour of observation in China.

# THE FAR EASTERN REVIEW

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## Editorial Comment

### The Chinese Political Fog

The first six years of Chinese experimental republicanism never failed to sustain the interest of the foreign community in China in the tide of what appeared to be development. When there was not a new government, in new hands, developing and breeding hopes, there was a declining government to watch and to comment upon in more or less scathing terms. And then when a decadent régime actually went up in smoke it was intensely interesting to speculate upon the personnel of the next one and to prophesy its character. In these first few months of the 7th year of the Republic, however, apathy seems to have grown upon the prophets, the critics, and the political "fans." Those who should know most of what is going on, and of what is likely to happen, gesture and pen their despair and confess that they do not know how things are going, that they do not understand what transpires before them, and that they have ceased to formulate hopes.

We wrote two months ago, in the last comment which we ventured on the Chinese political situation, that "politics, as such, had ceased to exist in China." Matters have not improved. They have simply become more bewildering. In Peking, where the foreign community usually talks politics with something like avidity, one seldom hears Chinese affairs mentioned. The foreign journals published in China head their reviews of Chinese affairs with "The Chinese Muddle," "The Political Fog," and similar bold confessions of despair or disgust, while the Chinese papers have turned flippant and fill columns with decidedly irreverent satire upon the heads of the state. It is indeed almost futile to outline what has happened during the past two months, for a recital of the daily events leads nowhere, and the official expressions of opinion, mandates, telegrams, and other documents are a maze of contradiction, vacillation, and evasion.

Towards the end of last year President Feng Kuo-chang issued a peace proclamation which was intended to make possible a compromise between the irregular forces under the various Southern leaders and the Northern militarists whose political preferences shape the policy of the Peking Government. At that time Yochow, an important city on the Yangtze River, and also upon the mouth of the Tungting Lake in Hunan, was still in the hands of the Northerners. Liu Chen-hou, who championed the Northern cause in Szechwan, was making headway against the Yunnanese, and Lung Chi-kuang had come over to the Kuangtung mainland from the island of Hainan to drive the forces of both Lu Jung-ting, dictator of Kuangsi and father of the Southern campaign in Hunan, and the Sun Yat-sen following out of Kuangtung province and the city of Canton. The peace proclamation was not enthusiastically received anywhere. The

Northern militarists announced that they would fight the South whether the Central Government did or not, and the Southerners, from their various camps, issued demands and terms which simply aggravated the hostility of the politicians north of the Yangtze.

Generals Tsao Kun of Chihli, Chang Huai-chih of Shantung, and Ni Shih-chung of Anhwei were particularly loud in their demand for the cancellation of the peace mandate and the promulgation of a formal declaration of war upon the South. Both President Feng and his colorless Prime Minister Wang Shih-chien, tried in every way to avoid and evade such a step, and finally compromised by appointing Tsao Kun, Chang Huai-chih, and Chang Chin-yao leaders of a punitive expeditions—not ostensibly against the main forces of the South, but against certain petty sympathizers in Hupeh province who had demonstrated their sympathy with the southern cause by declaring their "independence." Except for an endless exchange of endless telegrams, the trotting about of countless emissaries, the promulgation of scores of camouflage mandates, and a perfect swirl of rumor and gossip over all, matters remained stationary and uninteresting until the President's spectacular excursion to Tientsin, Tsinanfu, and Pengpu and return.

Those who had become apathetic and were dozing over the situation sat up when this happened. On the evening of January 26, President Feng Kuo-chang left Peking on a special train with a secretarial staff and a few hundred bodyguards and proceeded towards Central China. He gave the world to understand that since his Northern military commanders quibbled so much about the sort of mandate they wanted issued before fighting, he was going to see them personally and persuade them to coöperate with him in a campaign against the Southern rebels. Some officials believed this and others did not. Theories to account for this unusual move were many, and among others was the theory that the President was leaving Peking to resume his old position at Nanking where he had enjoyed the strategic advantage of being able to flirt with both the South and the North, imposing his ideas upon both and drawing strength from both without committing himself to any policy. The pursuit of this game in Peking had isolated him. He was completely in the hands of the former followers of Tuan Chi-jui so far as the local administration and control of the Northern provinces and even of the city of Peking were concerned. The South had nothing to fear from him, so showed him no respect, and his old follower Li Shun, Military Governor of Kiangsu, resident dictator at Nanking and controller of the political policies of Hupeh and Kiangsi, did not trust him and was inclined to follow his own bent in all matters of interprovincial war and politics. It was assumed therefore that the President hoped to get back to Nanking where Li Shun would be immediately under his

thumb, and from that strategic point to dictate to his friends and enemies on both sides to his own aggrandizement. Now, as matters transpired, it would seem that this was the correct reading of the President's purpose. If so, the flight was a failure.

At Tientsin President Feng saw Tsao Kun, was coldly received and scolded mildly for trying to run away. So it is reported, at any rate. At Tsinanfu, Chang Huai-chih exerted his influence to dissuade the chief executive; and at Pengpu, if we are to believe witnesses, Ni Shih-chung abandoned argument, adopted abuse, and flatly refused to let the President go any farther; whereupon, it is further related, President Feng wept over his indignities and turned back.

Under these circumstances the President's return was a capitulation to the Northern militarists, and, in order to put a good face upon the situation, he promptly adopted a bellicose attitude towards the South and entered into the schemes for the recovery of Hunan and the punishment of the rebels with seeming zest. A final explanation of the reasons why the old and discredited parliament could not be reassembled was given the various Southern leaders in a telegram of some length, and eventually mandates were promulgated establishing the new parliamentary system evolved by the National Assembly. Tan Hao-min, former Governor of Kuangsi, and leader of rebellious forces in Hunan, was degraded by mandate, and in similar documents Tsao Kun, Chang Huai-chih, Lung Chi-kuang, Chang Chin-yao, and a host of petty champions of the North were encouraged to do their best to beat reason into the rebel forces south of the Yangtze.

In the actual field, however, matters went badly. Yochow fell because the majority of its defenders refused to fight. Lung Chi-kuang suffered reverses in Kuangtung. The Cantonese and Yunnanese made great progress, and Li Shun, with his confederate north of the Yangtze, Feng Yueh-hsiang, "the Christian general," showed a decided disposition to declare war upon Ni Shih-chung on their own account in support of Li Shun's independent "national" policy, which, it is said, is uninfluenced by the policies or ambitions of any of the numerous parties of either the North or the South, but finds its keynote in opposition to the sort of militarism which Ni, Tsao, and Chang stand for, and in promoting a compromise between all factions which are not under the immediate influence of what is known as the "Tuchun clique."

While matters have been so confused and so seemingly hopeless in both the North and the South a great deal of interest has centered in Li Shun, whose position as king of a neutral zone on the Yangtze gives him great prestige among the politicians and whose announced doctrines and consistency in holding to them has won him the credence of many foreign enthusiasts. He has consistently refused to see and conspire with the numerous Southern politicians and has made no concessions to the Northern Tuchuns or to their campaign. While his military following is not large, his actual military position has been considerably strengthened since Feng Yueh-hsiang took his forces up river, supposedly on his way to support the Northerners in Hupeh, and landed instead upon Ni Shih-chung's preserves in Anhwei.

Meanwhile the South has formed a federation of rebellious factions. For this federation is claimed the support of Lu Jung-ting and Tang Chi-yao, potential monarchs of Kuangsi and Yunnan respectively. It supports the defunct parliament, the remnants of which are housed, together with the Sun Wen "government," in the Canton Cement Company, and clamors for the punishment of Tuan Chi-jui and a few others out of office, and for the blood of nearly every one in office. As a matter of fact, there is very good evidence that there is neither coherence nor cohesion, in the federation or its plans, and many of its promoters admit that both Lu Jung-ting and Tang Chi-yao, who have ambitions of their own and little use for the Sun Wen clique, are bound to the new organization by very slender threads. Their bond of union now is their common desire to get established and recognized jobs, power, prestige, and funds. Once these are attained, if they should happen to be attained at all, there

will be the same old war among the victors for the spoils. Parliament—the old parliament, that is—is already divided and classified under the leadership of half a dozen well-known politicians who, in anticipation of the struggle to come, are scarcely on speaking terms.

The latest developments are the arrival of fresh Northern forces in Hupeh, the temporary withdrawal of Wang Shih-chen from the Premiership, the assumption of that office by Ch'ien Neng-hsun, and Dr. Sun Yat-sen's preparations for procedure to the "eastern front," which is interpreted by his followers to mean the Fukien border, but by others to mean Japan, whither he will be sent by his following, it is said, out of deference to the prejudices of Lu Jung-tung, Tang Chi-yao, and others, who do not relish federation with a group leader whom no foreign or Chinese publication in the Far East will any longer take seriously.

So much for what has been going on. A recital like the above, dealing in generalities, is neither enlightening nor interesting, but if all the details were woven in, it would only be confusion confounded; and the only value of such an account is in demonstrating why the professional prophets and critics of Chinese politics write of the "Chinese muddle" and why the general public refuses to be interested. It is very generally agreed, however, that China's internal affairs have never been so chaotic and that the outlook has never been darker. The North has lost its military *morale* and there is nothing to look forward to in a Southern victory. One hears the opinion very generally and forcibly expressed among both Chinese and foreigners that the Chinese official class is unfit to rule, that it cannot evolve anything approximating a workable democratic government in China, that a monarchy is now impossible, and that the political education of the Chinese people, who are still regarded as good political material, has not advanced sufficiently for them to create a democracy of their own and rid themselves of the incubus which they carry in their predatory, irresponsible military and official class. The advisability of intervention has not only been whispered but loudly advocated in some quarters, while in others there is much talk of a "real revolution," a revolution of the people and not of the younger and hungrier politicians. While all this absurd political hocus-pocus is being acted in every center from Peking to Canton, banditry, make-believe warfare at the expense of the country over which it is waged, famine, plague, floods, droughts, bandit hordes, earthquakes, and unscrupulous officials are taking their very heavy toll of the peace, wealth and health of the Chinese people. Commerce is at a standstill in half a dozen great commercial districts. The Yangtze, the great artery of the richest part of China, is closed to trade above Hankow, and all the while Peking lives upon petty loans raised by mortgaging valuable national assets.

The cry goes up, when any one protests against the absurd and criminal war for jobs which is all that this civil war amounts to, "let them fight it out; every nation has had to work out and fight out its own particular problems." As an extenuation of internal warfare this is all very well where the body politic is warring upon its parasites, but when the parasites are simply warring among themselves, for nothing more than the supremacy of one species or another, to the pain and cost of the body politic, it is a different matter. The Chinese people, in whose moral, mental and physical fitness and in whose ultimate future few residents of China are lacking in faith, has not yet begun to war upon its parasites. It is suffering a war among them, and this explains why many good friends of China and many devoutly patriotic Chinese have brought themselves to talk of international intervention in China without serious qualms.

At all events it is now pretty generally conceded that the development of good government in China and the consequent development of industry, agriculture and trade along modern lines is not going to be furthered by the political ascendancy of China's northern Tuchuns or her southern Tuchuns, by her politicians or herself styled "patriots," as long as the Chinese people, whom they all claim to represent, are not aware that they are either represented or misrepresented. The work of the real reformer in China therefore is not in putting out this office holder and putting in that one, either by conspiracy or arms, but in helping to develop an intelligent and articulate public opinion in China. Representative government along democratic lines will not only be possible

but inevitable when the Chinese official class is responsible and is really checked by public opinion, and it is absurd, knowing the traditions and history of the official classes in China, to expect either democracy or honest representation before there is such a thing as public opinion. The Chinese people's ignorance of, and consequent lack of interest in, what is by courtesy known as the Government of China explains sufficiently the deplorable state of that Government. Under a workable democracy China would not only be a remarkably fine place for the foreign trader's business ventures, but also an exceedingly pleasant country for the Chinese to live in. Under the conditions of the moment it is a happy hunting ground for neither the trader nor the native. The solace lies in the fact that conditions are so bad that they cannot last long. Tribulation has its educational value. Every evil condition that arises in the interior brings the people a little nearer the "real revolution" which some look forward to, and every obstacle to foreign trade and development brings a little nearer the intervention which others pray for. Either would be a speedy Nemesis for the Tsao Kuns, the Ni Shih-chungs, the Tang Chi-yaos, the Lu Jung-tings, the Li Lieh-chuns, and the Tan Hao-mins of this country, and it is to be devoutly hoped that in some form it is not far distant.

## Chinese Journalism

In a discussion of all the various things which the Chinese people invented hundreds or thousands of years before any one else, one usually hears the Peking *Gazette*, the official bulletin of court and administrative news, formerly published by the Imperial Chinese Government, cited as the world's oldest newspaper. This description of the *Gazette* is rather misleading, unless it is made clear that it was an official organ only, published by the court and read by officials, and that until very recent years it was not only the oldest but the only periodical publication of any sort in China. Journalism as we understand it is comparatively new in China, and journalism along strictly Occidental lines is not yet understood by the publishers and editors of the numerous dailies, weeklies, and monthlies which appear in the Chinese language.

An item in a Peking paper recently announced that the students of the Peking Government University had petitioned their head, Mr. Tsai Yuan-pei, to establish a course in modern journalism for Chinese literary aspirants. The spontaneous foreign comment upon this piece of news was: "They need it!" We can do little more than explain and expand upon this comment.

The daily newspaper in the last two decades has come to be an integral factor in Chinese political life, not only in the Europeanized ports along the coast, but throughout the interior provinces. There is no accurate census of publications, but advertisers find that there are eighty or ninety papers published in Chinese which are worthy of consideration as advertising mediums, and native news agencies have extended their services to cover nearly two hundred papers which are well enough off to buy copy. When the political struggle in Peking is evenly balanced and the contest for offices keen, the number of papers published in the metropolis rises from a dozen or more to fifty or sixty, and at present there is no publication in the English language in Peking which is not owned and edited by Chinese. No one can deny that there is a growing interest in periodicals in China and that the power of the press is not beginning to be appreciated, but the Chinese, in taking hold of this Occidental institution, have done so with a conception of the purposes, uses, and ethics of a newspaper peculiarly Chinese.

The Chinese newspaper does not make its appeal to the people, but to the official classes. It does not attempt either to voice or to shape public opinion, for articulate public opinion, as we understand it, has not yet come into being in China. It does not even voice the aspirations of the middle class—the commercial class in China—for, with the exception of a few large papers in the big Treaty Ports, no Chinese paper pretends to live

either upon its advertising or its circulation. It lives upon its political subsidy, either granted by a political aspirant when the paper is started or extracted from those in office by methods closely akin to blackmail. With the exception of a few colloquial papers, which contain much scandal and little accurate news, all papers are written in a literary style which makes reading painful and tedious to the great mass of the people; hence they do not read. For this reason there are not five papers in China with a circulation of over ten thousand. When advertisements are not printed free to fill up space they are charged for, not according to the circulation of the paper, but according to the relative age, standing, and respectability of the organ. To this of course there are exceptions in places like Hongkong, Shanghai, and Tientsin. As a general rule, however, a Chinese newspaper is started and maintained, not as an educational medium or as a business venture, but as a medium through which an official or a politician can boost his own stock in official circles, or do material damage, in the same circles, to a political rival. The papers that are not started with a definite understanding with one political leader or another are frequently brought into existence by journalistic adventurers who have just enough capital to make an initial display as a bait for the politicians, who then are called upon to bid for the control of the "editorial policy."

In gathering news a Chinese editor does not rely upon reporters, but upon the friends and retainers of his political patron, and upon clerks and scribes in Government offices who are paid to "leak" information. If the information that emanates from these sources is not already colored to suit political purposes, the editor makes it his business to doctor it and *camouflage* it beyond recognition.

The establishment of a true representative democracy in China has been impossible up to the present because the "representatives of the people" really represent no interests but their own and are uncontrolled by intelligent public opinion, and because the rulers of the people, fully aware of popular ignorance of politics, take advantage of this ignorance to work in their private interests. Independent journalism, commercially self-supporting, and addressed to the people in a language understood by the people instead of to the officials, would revolutionize political conditions in China, and would create more consternation in the ranks of predatory and self-seeking officials than any other institution. The scholastic influence in this field should be a good influence and the suggestion which comes from the students of Peking University is one that is worth supporting.

## Paper Money from Osaka

China's currency troubles, which have been the source of as much tribulation for the foreign trader in the East as they have been a source of profit to the native money changer, have been multiplied in the last decade by the ingenuity and enterprise of the Oriental note counterfeiter. Bad money in China is as old as money. Every one, native or foreign, who has occasion to handle coinage in circulation in the Orient forms the habit of ringing, biting, or otherwise testing every bit of metal which passes through his hands. Until recent years, however, bank notes of foreign design have been fairly immune, but now that the arts of photography, engraving, and printing are being mastered by both Chinese and Japanese, the number of people who aspire to manufacture their own money is increasing by leaps and bounds, and the counterfeiters of the East are often fully as skillful as the official engravers and printers and are only balked by the superior knowledge of color work and the ingenuity in inventing secret processes and concealed marks of European and American note printers.

The recent discoveries by the Japanese police of counterfeiting establishments in Osaka, which were grinding out Russian and Chinese notes of good workmanship in astonishing quantities, have served to give publicity to a condition of affairs with which bankers and officials throughout the East have been only too

familiar in recent years. The Japanese official printeries have long been waging an unsuccessful war upon their countrymen who persist in manufacturing and circulating Korean notes with almost as much facility as the Government, and nothing but the thoroughgoing and rigorous police control in Japan has prevented similar liberties being taken with the domestic notes. Presumably the same offenders are responsible for large counterfeit issues of the notes of nearly every provincial bank in China and for many crude attempts to forge or doctor the notes of foreign banks in China or the notes manufactured abroad for Chinese banks. Foreign printed notes owe their comparative immunity chiefly to the fact that Japanese and Chinese engravers and printers have not yet mastered their arts, and partly to the fact that their note issues are small. Counterfeiters are not fond of forging notes which run in small issues. This fact alone protects the notes of the Yokohama Specie Bank in China. Chinese offenders are still less skilled, and while they make many serious attempts, through photographic processes, to reproduce native note issues, they are not nearly so serious a menace as the Japanese counterfeiters.

The need of paper money which is proof against the Osaka imitation has been keenly felt in the provinces where whole note issues have frequently depreciated because counterfeit paper was so common that the people put no faith in any kind of money but hard coin, and refused to accept well substantiated note issues. The magnitude of some of these counterfeiting enterprises may be judged from the fact that a man was recently caught in Hankow with 46,000 counterfeit notes, of various denominations and of Japanese manufacture, which he was passing as Hupeh provincial notes. One hears from Newchwang of the seizure of well engraved plates from Japan, and in Shanghai all classes of commercial folk are continually on the alert for forged trade marks, counterfeit notes, and forged documents of an official character manufactured by ingenious Japanese and by less ingenious but just as industrious Chinese. The multi-color note manufactured abroad is still the only engraved work which is proof against the skill and enterprise of the Oriental note forger. The popular realization of this fact has created a peculiar situation in the province of Hunan, where notes of both native and foreign origin were once in circulation. The native notes have been extensively counterfeited and have consequently depreciated. The notes printed abroad have defied the genius of Osaka and have therefore been hoarded to such an extent that they have passed completely out of circulation and are to be found only in the strong boxes of the cautious!

## The Good Roads Movement

It is always a satisfaction to hear that roads are being built anywhere in the Orient. Before the introduction of railways it was never considered the state's duty in any part of the East to furnish means of communication except to facilitate the movements of an emperor or of his retainers and messengers, and now that we have railways, those in charge of them are inclined to look upon road building with a jealous eye. The economic value of good roads, the right of the tax-paying populace to good roads, and the convenience of them are beginning to be impressed upon the Chinese and their neighbors, however, and one hears road projects discussed in purely Oriental circles, not as radical innovations but as necessities. The FAR EASTERN REVIEW reported a few months ago with becoming éclat the opening of a new road in Hunan. Recently we have given some account of the work which is being done on the Peking-Tientsin highway with Red Cross and Chinese Government funds. Now we have to report that work is being done on a modern road from Hoihow to Kiungchow on the island of Hainan. An old trail is being made wider, and over the old track, when it is sufficiently shaped, will be laid a coating of stone and cement.

In a recent article on improved relations between Siam and French Indo-China, M. Ernest Outrey announces with satisfaction that the first respectable highway between these two territories

is about to be built from Pakse to Ubon. All trade and traffic between Indo-China and Siam has hitherto been carried by sea-going or river-going craft and the new road, now under survey, will for the first time connect the valley of the Nam Moun with the Mekong. On the road question M. Outrey writes further:

"The road from Pnompenh to Battambong has been prolonged to Sisophon, and is going to be continued to Poipet, that is to say, to the Siamese frontier, distant forty kilometers from Sisophon. Now the metaling of this road from Pnompenh to Sisophon (about 390 kilometers) is on the point of being completed, and the road can be easily traversed by motor car. That is also true of the road connecting Pnompenh with Saigon (about 230 kilometers). If the Siamese on their side constructed a road from Bangkok to Poipet, a distance of about 240 kilometers, the problem of the establishment of rapid communication between the capitals of Siam, Cambodia, and Cochin-China would be solved satisfactorily, since three days would suffice for the journey of 900 kilometers between Bangkok and Saigon."

To return to China, the good road idea has taken a strong hold upon the imagination of the younger generation in Shanghai and at a meeting of progressive and influential young men it was very recently suggested that the provincial authorities of Kiangsu and Chekiang provinces be urged to connect Shanghai and Hangchow with a motor road. The suggestion was enthusiastically received and, judging from the interest displayed, the idea will get as far as the provincial authorities, if no further.

## China Successfully Fights Plague

Whatever criticisms may have been properly or otherwise directed against the Chinese Government for their apparent inactivity when plague appeared on the Mongolian border are by no means justified now, for the authorities concerned are doing their utmost to stamp out the pest. Local prejudices are being overcome, unsympathetic officials are being removed, and the services of foreign doctors are being utilized as far as possible, with the result that there is coöperation on the part of the governing authorities and medical men in the work of plague prevention. Admittedly, perfection has not been reached, but it must be acknowledged that the Ministry of Interior is fully alive to its responsibilities, and foreigners are willing to concede a mead of praise to the Chinese authorities for having so promptly set to work to check the spread of the dread disease and for the success which has crowned their efforts. True, they could not have accomplished what they have done had it not been for the assistance of foreign medical men and Chinese foreign trained doctors, but it is to their credit that they have accepted the offers of such disinterested workers and have utilized their services to the full and availed themselves of their medical experience and judgment. Surely this is an indication of progress? Time was when Western medical skill if not despised would have been rejected. Fortunately those days have gone, and China is grateful indeed for the benefits brought to them by the missionary and other doctors from Europe and America. Local prejudices against foreign medical assistance still survive, but that is only to be expected in a country where the masses have been allowed to cling to timeworn beliefs and practices. Unenlightened natives have not been the only opponents of Western medical practice. High-placed officials, who ought to know better, have too often obstructed the doctors who came to deal with the diseases to which a particular locality was subject, and it is regrettable that in the early stages of the present outbreak, civil and military officials did not assist the foreign doctors, who risked their lives in order to combat the terrible scourge which was visiting the borderland of Mongolia and Shansi. Happily, misunderstandings have been removed, and under the tactful guidance of General Chiang, President of the Plague Prevention Commission, a coöperation has been secured which augurs well for the early suppression of the plague.

Before proceeding to details, attention may be invited to a telegram addressed to the Taojin of Paotingfu by the Neiwupu. It is seldom that the authorities indulge in such straight talk. This official is publicly charged with neglect of duty in not properly carrying out the preventive measures which he was asked to enforce, and he is ordered to see that the offense is not repeated. Moreover, he is reminded of the "new regulations governing the punishment of officials in plague prevention work." The value of this public reproof is that it comes under the notice of others than the particular official to whom it is addressed. Such action indicates the earnestness of the Ministry of Interior in the matter of plague prevention. It also shows that indifference and carelessness on the part of officials will not be tolerated. Perhaps the good intentions of the Plague Prevention Commission may not in every instance be carried into effect, but it is something to have these good intentions based on an enlightened sense of public duty.

Appreciation of what has been done to check the plague will not be lessened when it is pointed out that the area of the present outbreak is larger than that which occurred in Northern Manchuria some six years ago, that the number of deaths is fewer, and that the money expended in prevention is less. In this connection, it may be stated that the Commission do not expect that the full amount of the plague loan of one million dollars will be expended, and it is hoped that the balance may be available for the expansion of the isolation hospital in Peking and the establishment of a sanitary bureau and laboratory.

The mistake which permitted the plague to travel through the mountain passes into the plains has been remedied. These passes are now adequately guarded by military or police. Further precautions are taken by the establishment of quarantine stations, and on the Kin-Han Railway there are no fewer than ten foreign doctors engaged in guarding against the spread of the disease.

Enough has been said to indicate that the work of plague prevention is being earnestly and thoroughly undertaken. That this is so is abundantly proved. The Peking-Mukden and the Peking-Hankow lines are still running, thanks to the prompt and energetic measures taken to secure their immunity, and no large center of population has been attacked. Peking and Tientsin are safe, and there seems little doubt but that the pest will be confined to the comparatively few cities in which it is still taking toll of human life.

## Anti-Japanese Movement in Manchuria

According to reports, both Chinese and Japanese, which have been coming out of Manchuria for more than a month past, the perennial Sino-Japanese antagonism, which makes life in Manchuria rather trying for all concerned, is receiving fresh inspiration from both sides. The Japanese accuse the Chinese officials of instigating anti-Japanese feeling and of carrying on a deliberate propaganda, calculated to make life miserable for the Japanese, while on the Chinese side one hears much of Japanese arrogance, of carefully staged military demonstrations in centers of Chinese population where the Japanese have no jurisdiction, and the like. There is probably truth in the charges made by both sides. By virtue of treaty arrangements entered into after the presentation of Japan's Twenty-One Demands upon China in 1915, the Japanese in Manchuria, who are now numerous enough to seem omnipresent in the sight of the Chinese residents, acquired rights which the Chinese officials cannot openly prohibit them enjoying but which they can materially circumscribe by carrying on a quiet and unostentatious propaganda among the people. The Japanese, aware of this undercurrent of influence working powerfully against them, also resort to typically Oriental means of overawing the population, and the result is a bitter and sustained antagonism which frequently manifests itself in the "incidents," so thoroughly advertised by each side as evidence of the perfidy and malice of the other.

The final settlement of the Kirin-Changchun Railway agreement has prompted the Chinese of Kirin to organize anti-

Japanese demonstrations, the object being to influence both the Peking authorities and the Japanese to revise the terms of an agreement which places the direction of a Chinese railway in alien hands. The disposal of this railway was, however, definitely settled by the treaty of 1915 and nothing but the adjustment of the details is of recent date, so the Chinese popular protest is decidedly belated and likely to receive little official attention. It has served, however, to draw from the Japanese counter demonstrations of a military character in both Kirin and Changchun, where detachments of Japanese soldiery have paraded the streets and have been enthusiastically welcomed by the Japanese residents.

By this same treaty of 1915 Japanese were given the right to lease and purchase land in Manchuria for agricultural and industrial development. Since there is no chance of reversing the terms of the treaty, the Chinese officials, according to Japanese news reports, have in their unofficial capacity been exhorting the people to refrain from leasing land to the Japanese, and have smiled upon movements among the people to punish all Chinese who entered into land transactions with Japanese. General Chang Tso-lin and Prefect Chu, of Mukden and Shenyang respectively, are most bitterly attacked by the Japanese journals for fostering anti-Japanese movements among the Chinese people.

It is difficult to foresee any satisfactory adjustment of the strained relations between the Japanese and Chinese. The Japanese enjoy so many treaty rights in Manchuria that the Chinese officials cannot resent Japanese military demonstrations, but on the other hand it is impossible for the Japanese to take official cognizance of movements among the Chinese people, such as boycotts, which cannot be clearly traced to official influence. Such situations usually either come to a head in an act of violence, which brings the whole trouble to Peking and results in the humiliation of the Chinese, or they result in a breakdown in the Chinese popular organization, in some one "selling out," and in all others following his example. It would be very unusual indeed if the Chinese were to gain any advantage from either passive or active resistance to the Japanese advance in Manchuria.

## Bolshevism Contagious

Japanese journals have been remarking, some with consternation and others with satisfaction, that the one development of the great European War which has stirred the masses of the Japanese people to intelligent interest has been the rise of the Bolsheviks. The announcement of the ethical tenets and the war purposes of France, Great Britain, and America, has made painfully little appeal to the Japanese, as their journalists have frankly admitted, but the chaotic rise of the illiterate Russian mobs has proved to be of engrossing interest. One sees in the liberal Japanese papers more and more comment in recent months upon the limitation of suffrage, upon the autocratic manipulation of public affairs by the militarists, upon the age and conservatism of the members of the Genro and upon the heavy taxation and misery of the masses, who are now said to be anything but patriotic except when under arms.

We hear now that the time has come for "the second revolution," that under the bureaucracy no strong young men are being developed, and that the strong old men who rose to positions of eminence after the first revolution are not alive to the needs of the age. A radical society has recently been organized among university students and graduates which announces a program that must look very bolshevistic to the bureaucrats, and which was suppressed by the police at the first meeting in Kanda. There is no reason to look forward to violence and revolution in Japan, but there is every reason to believe that there is enough unrest and sufficient yearning after a more democratic form of government to force from the bureaucracy some very important concessions within the next few years. The spokesmen of the old school have been announcing with decision lately that Japan is not in this war to make the world safe for democracy, but the keen popular interest which the press and the people are taking

in the collapse of autocracy in Russia would seem to indicate that the rulers and the people are not so much of one mind and thought as the former would sometimes have us believe.

That the democratic idea, so widely championed by the Allies, is causing the Japanese Government "furiously to think," is apparent from the following account of a discussion in the Japanese Diet as reported in the *Herald of Asia* for February 2:

"Mr. Keigi Ozaki, of the Shinseikai, asked the Government's conception of the possible effect on the minds of the younger Japanese of the idea of 'Democracy,' so loudly upheld by the Allied peoples, even by our Chinese neighbors.

"The Minister of Education, Mr. Okada, in reply, said that the word 'democracy' bore different significances even among the Western peoples themselves, and, as Japan had its own peculiar national polity, there was no reason why this people should assimilate all the Western ideas. The educational policy of Japan should be based on the Imperial Edict on Education and, while it is questionable whether the idea of 'democracy' is consistent with the ideas enunciated in that Edict, yet all thoughts that are foreign to these ideas should be rejected. Even the philosophical ideas of the students should be kept in harmony with these ideas."

## Hun Worship in the East

Japan and China are both technically at war with Germany, the opportunities and mediums for organized German propaganda are decidedly restricted throughout the Far East, unlimited advertising is given in all languages to the war purposes and pledges of the Allies and of America, and the evidences of German cruelty, barbarity, bad faith, and overweening ambition which have been printed in the Orient would stock a library; yet we are continually being reminded that Germany has many sympathizers in the East, and there seems to be a tendency among all classes in both China and Japan to express a sneaking admiration for the German, both individually and collectively, at every opportunity.

It has only recently been reported from Harbin that the Chinese of that community were much gratified by the news of the settlement arrived at between Germany and the Ukraine, because it gave promise of a reopening of German trade with China via Siberia. No consideration whatever is taken of the fact that the Republic of China is at war with the Central Powers, and it never occurs to the Chinese traders in question that the Allies might take steps to prevent German trade re-entering China while the war is in progress. Trade is utterly detached from patriotism, and the mere fact that the Chinese nation is at war with the German nation is no reason why the Chinese individual should be at war with the German individual. In China there are not only a great number who would enter into amicable relations with the Germans if the opportunity offered, but there are many more who would actually champion the German cause out of admiration for the methods and tactics which have made Germany strong. In a certain school in Peking in which there are foreign instructors, chiefly American, the number of students who have shown an interest in the German language and in the study of German institutions has vastly increased during the past few years, and the efforts of juvenile essay writers in this school are often devoted to extravagant praise of German thoroughness, efficiency, courage, and power.

In Japan it is much the same. Only recently in the Japanese Diet, a Mr. Suzuki remarked that the Germans were on the whole superior to other nationals, both physically and intellectually, and wanted to know whether the Government was studying the reasons for German strength and patriotism with a view to emulation. With as good a cause to present as the Allies have, it seems absurd that those in charge of propaganda have allowed such notions to take hold of great numbers of both the Chinese and Japanese people. There is little chance indeed that the Hun and his Oriental admirers will be able to get together during the

war, but if no adequate check is placed upon this foolish and ill-founded admiration for the Teuton through counter propaganda, the Germans will find a ready welcome to the Orient when the war is over, and will have a prestige among all classes which will enable them to set up as criterions and models—to act as the apostles of their crude and beer-logged "Kultur," in other words.

## High Cost of Living in the East

The Far Eastern peoples, who are sometimes accused of a lack of sympathy with the war aims and war-time movements of the Occident, can at least lay claim to a community of interests when the cost of maintaining a bare existence is discussed, and the press, in many languages, from Singapore to Siberia, seems to be discussing this topic with more than passing interest. Not only has the foreign resident to struggle to maintain his high estate in the small and exclusive communities which fringe the continent of Asia and the shores of the various islands, but the native populations also are feeling the pinch and are feeling it just where the populations of the Western nations are feeling it. Standards of living are going up, prices of imports—once luxuries but now necessities—have already gone up, and the salaries of the respectable middle class folk, particularly of the professional small fry, are just where they were, and are even on the decline in some centers.

In the chorus of complaints from all quarters of the East the Japanese wail is perhaps the loudest, undoubtedly because the Japanese are the most highly modernized and have acquired the most expensive tastes of all the Oriental peoples. There is no complaint from the workers, for their salaries in Japan are now phenomenally high, and there is no complaint from the big traders and the manufacturers, for they have been coining money. The groans come from the middle class teachers, professors, writers, editors, clerks, accountants, Government employees, police, officers in the army and navy, and many others whose salaries are now much lower than those of the skilled laborers and who have to dress, live, and educate their children in keeping with the traditions of their class. The wife of a Japanese army officer in an itemized account of her household expenses made out some time ago before the last twenty per cent leap in prices, revealed the fact that by exercising the most careful economy she contrived to save two yen out of an income of yen fifty per month, making no allowance for sickness or accidents. This she was able to do because her parents helped clothe the children and because she and her husband saved their own garments by staying at home.

In the commercial centers in China what might be called the clerical class is suffering unduly from a combination of evil conditions which renders its existence precarious. The standard of living in cities like Shanghai and Tientsin has gone up 100 per cent in ten years. Overseas trade is dull on account of the war and internal trade is uncertain on account of perpetual revolution. The number of trained, English-speaking, salaried men has increased enormously in a few years and the demand for them has decreased noticeably during the past year or so. A Chinese vernacular paper recently commented upon this situation by offering to supply any number of men who could have commanded a salary of \$150 a month three years ago, at \$50 a month. This in spite of the fact that it costs about thirty per cent more to live now than it did three years ago. Even from the Tibetan border an agitated correspondent wrote some time ago that the prices of meat and flour had doubled in the past eighteen months.

The foreigner in the East also faces economic difficulties. A paper published in the Straits Settlements recently gave space to correspondence from residents, who itemized their domestic budgets for the benefit of the public, and it transpired that a cautious and economical bachelor's annual expenses in that quarter of the Orient amounted to £632 a year, which is really a good deal more than the average salary. Yet the firm which sends a

representative to the Orient on a lesser salary than this is consigning him to something equivalent to the hall bedroom and the dairy lunch; while a man who is expected to join clubs, entertain, and otherwise maintain social prestige needs at least double this amount.

## Giving China Her Dues

China, unlike the Occidental nations, is so circumscribed by treaty arrangements that she is not at liberty to fix her own tariff rates or to determine the value of taxable imports and exports, as a basis for the levying of customs tariffs, without the concurrence of the Treaty Powers. The Chinese import and export tariff is five per cent *ad valorem*, according to treaty, and the specific values upon which this tariff is collected were fixed as long ago as 1902, on the basis of figures obtained during the last years of the last century, so that the tariff now collected is not actually five per cent of existing values, but, as estimated, about 3 per cent or a little more. These facts account for the presence in Shanghai of a number of tariff experts in a Com-

mission on Tariff Revision, representing all the nations vitally interested in Chinese trade except the Central Powers. The immediate revision of the tariff with the object of bringing the schedule of values of imports and exports up to date is an expression on the part of the Allies and of America of their appreciation of the moral support China has given the Entente cause by her declaration of war upon Germany and Austria. It is not a *quid pro quo*, for the revision now being made was due the Chinese ten years ago. Its postponement has been an injustice, and the revised schedule will not restore to China the revenue which she has lost during the past decade through the obstruction of the Japanese, who have consistently opposed revision in the interest of their cotton industry; but it is a recognition of the imperative need of executing justice in keeping with the revised international ethics which the Allies have evolved from the great war.

The arrangements for the revision of the tariff were made a few months after China's declaration of war, and the sessions of the international Commission were announced for January five. On that date a meeting of the few who had arrived in Shanghai was held, and about two weeks later the delegates actually entered upon their work in the Chinese Chamber of Commerce Building. The Japanese press reports that the following

Mr. G. Symnerberg (Rus.)  
Mr. S. Latkine (Rus.)

Mr. Julio Palencia (Sp.)  
Dr. J. E. Hultman (Swed.)  
Mr. J. H. de Reus (T. Neth.)  
Mr. Willem Kien (T. Neth.)  
Mr. Julean Arnold (U. S.)  
Mr. John K. Sague (U. S.)  
Mr. Yü-Chüan Chang (Ch.)  
Chairman, Mr. Tséng Shu-chi (Ch.)  
Mr. Luther M. Jee (Ch.)  
Mr. Li Ching Ming (Ch.)  
Mr. W. Way Tam (Ch.)  
Mr. L. A. Lyall (Ch.)  
Mr. M. E. Weatherall (Ch.)  
Mr. D. Siffert (Belg.)  
Mr. M. Demets (Belg.)

Mr. T. Raaschou (Den.)  
Mr. C. J. Knipschildt (Den.)

Mr. V. Grosse (Rus.)  
Mr. M. F. Rocha (Pg.)  
Mr. J. R. D'Oliveira (Pg.)  
Mr. T. Knudtzon (Nor.)  
Mr. S. Oyama (Jap.)  
Mr. S. Hayakawa (Jap.)

Mr. C. E. Anton (G.B.)  
Mr. H. H. Fox (G.B.)  
Mr. H. J. Brett (G.B.)  
Mr. H. Madier (Fr.)  
Mr. Jean Knight (Fr.)  
Mr. H. A. Wilden (Fr.)

Mr. Nob. Gav. G. de Rossi (It.)  
Mr. E. Denegri (It.)  
Mr. Hugo Reiss (Braz.)  
Mr. Witson S. Shan (Ch.)

ENTRANCE

ENTRANCE

is a summary of the rules of procedure adopted during the opening sessions:

The senior member of the Chinese delegation shall preside at the conference.

The date of a session shall be announced beforehand by the chair each time.

The majority shall prevail at the sessions, except in such matters as have special relation to any of the countries represented at the conference.

Each country represented at the conference, irrespective of the number of the delegates, shall be entitled to one vote.

All opinions, together with matters for reference, shall be submitted to the chair for distribution to the members.

Both Chinese and English shall be used at the conference.

All statements made by the members shall be entered in the minute book in Chinese and English.

The entries in the minute book may be altered by the members concerned.

When there is anything requiring consideration by a committee, the chair shall appoint the committee and the results of the deliberations of the committee shall be debated upon.

When the chair is prevented from attending, the Chinese delegate second in seniority shall take the chair instead.

Following the precedent established in 1901-2 by the commission which fixed the schedule now in force, the first matter brought up was the arrangement, for China's immediate benefit, of a provisional schedule of values as a basis for the collection of what might be described as a provisional tariff, this schedule to supersede the present antiquated price list and to remain in force until superseded by the new permanent schedule which the commission is empowered to draw up.

The results of the weekly meetings which have been held have not been given out for publication. It was surmised before the Commission came into existence that the conference would be a more or less strenuous debate from beginning to end, and from the reports in the Japanese press and from furtive gossip in Shanghai, it may already be gathered that the new tariff is not to be made in a day. The Japanese press reports that there has already been some difference of opinion between the American and Japanese commissioners, and the preparation of a provisional schedule, which will go into effect two months after it is completed and remain in effect until the fixed schedule is finished, was at first opposed by the Japanese commissioners who had no instructions to pass upon this question. The provisional schedule was, however, agreed upon February 13 and a subcommission is now working upon it.

The one matter, however, which is of most interest and importance to the Chinese and the Treaty Powers, is the settlement of a basis upon which the final schedule of values will be made up. It is assumed that the Powers will express a desire to take the average values of imports and exports during the three years prior to the European War as a basis, and that the Chinese will insist upon using the figures for 1917. The foreign Powers would naturally argue that owing to the war all existing valuations upon merchandise are abnormal, and by comparing the annual leaps in values during the past three years with any previous three years, could easily prove it. The Chinese on the other hand will argue that while prices have risen abnormally there is no reason to believe that the values of merchandise will decline appreciably after the war. They will also argue that whatever the fluctuations in values may be at some uncertain time after the still remote peace in Europe, a tariff based upon the values in the years prior to 1914 would not give China a 5 per cent ad valorem now, nor for the period of the war during which prices will continue to rise, nor for the period after the war while values are undergoing some sort of an adjustment. As a further argument the Chinese can point out that for a decade they have not been getting their five per cent ad valorem, that no one has offered or even suggested compensation for this injustice and that, if the existing values should by any chance suffer a relapse in the near future, any excess duties which China might have the good luck to collect would no more than balance what she has been deprived of in the past.

The settlement of this question does not rest with the commission now sitting in Shanghai, but must be thrashed out between the Legations in Peking and the Chinese Ministry of Foreign Affairs.

## Dutch East Indies in Business for Themselves

Reports from Amsterdam and Rotterdam would indicate that shipping conditions which have prevailed for the past three years have diverted from Holland a great percentage of her colonial trade and that the middlemen of the big Dutch ports fear that the loss of trade with the Dutch East Indies will be permanent and that the coffee, tea, rubber, and tin producers of the Dutch colonies, having found direct trade with America, Great Britain, and other nations more economical for all parties, and, at the same time, more profitable, will not consent to ship through their Dutch agents after the war.

America particularly has taken advantage of the shipping difficulties and the restrictions imposed upon Dutch imports by the belligerents who control the seas, to invest liberally in East Indian rubber interests, to establish elaborate buying organizations in all the big shipping centers such as Batavia, Soerabaya, and Medan. For the control of the rubber export London and America are now entering upon a keen competition, the advantage being slightly with the Americans, but Holland is completely eliminated from the competition, and the Dutch wholesalers have resigned themselves to the loss of this trade for good and all, according to the *New Financier*.

American consular reports used to show a very big annual export of East Indian coffee from Amsterdam to the United States. This past year no such item has appeared in the statistics. On the other hand direct coffee exports from the Dutch East Indies to American ports were in 1917 nearly six times what they were in 1916, while Holland, instead of being the clearing house for Indian coffee is seriously threatened with a coffee famine.

The Dutch Government learns from Java that the direct export of tin from East Indian ports to other nations has been found so economical that all thought of carrying on this trade through home ports after the war is abandoned.

## Japan and the Chinese Customs

Out of a war hardship a Japanese editor in Manchuria has conjured a solace for his people. It seems that according to a recent ruling in Hongkong, when exports of other goods than food stuffs were prohibited to non-Chinese ports, the port of Dairen on the Kuantung peninsula was classed as Japanese and not as a Chinese port. Now the editor of the *Manchuria Daily News*, believes, with what foundation we do not know, that if the Dairen trade with adjacent Chinese territory were added to the total of Japanese trade with China, Japan's China trade would be greater than Great Britain's. Great Britain has an understanding with the Chinese Government that while she predominates in trade with China the Inspector General of Customs shall be a British subject. This provision practically implies a British controlling interest in the Chinese Maritime Customs.

The observant editor in Manchuria therefore remarks that since the British have recognized Dairen as a Japanese port in a prohibition, "Japan's claims for a better recognition in the Chinese Customs Service will be made so much the stronger."

About a year ago a considerable amount of interest was aroused in the United States by the announcement that a professor in one of the Japanese Universities had invented a successful incombustible substitute for celluloid, to be manufactured from soya bean cake. The new product has been given the trade name of "Satolite," derived from the name of the inventor, Prof. S. Sato, and a company for its manufacture has been started with a capital of Y. 2,000,000 (\$1,000,000). Satolite is a galalith made of the glucine of soya bean, coagulated by formaline. It is said to be produced much more cheaply than ordinary celluloid, and to have several advantages for industrial use not possessed by the latter. The factory is to be built in the Mukojima district in Tokyo, and the actual production soon will begin.

# The Union Insurance Society of Canton, Ltd.

## A Wealthy Company Expands Its Activities

Some interesting facts in connection with the history and financial position of the Union Insurance Society of Canton, Ltd., were disclosed by the Hon E. H. Sharp, K.C., in the Supreme Court at Hongkong recently, when he made an application for the approval of certain alterations in the Memorandum of Association of the Society. The petition placed before the Chief Justice was signed by Mr. C. Montague Ede, General Manager, and Messrs. Holyoak and Lang, Directors of the Society.

The Society was incorporated in its present form, said Mr. Sharp, in 1882, but existed long before that date. It was originally started in Canton as early as 1835, in what were called the "factory days," by a group of British merchants, and from that time until the present its shares had been mainly held by British subjects. The company was essentially a British concern. In 1841, on the cession of Hongkong to Great Britain, the business was transferred from Canton to Hongkong. The Society had had a career of extraordinary success. Its progress and expansion had been continuous and were still increasing. By sound business methods, it had achieved a position which was in many respects unique.

The original paid-up capital of the Society in 1835 was a quarter of a million dollars, with authorized capital of \$1,250,000. To-day the authorized capital was \$4,000,000, of which about \$1,500,000 was paid up.

In addition, the Society had accumulated reserve funds of over \$4,500,000, besides its uncalled capital of nearly \$2,500,000, making what were practically reserves amounting to a total of about \$7,000,000.

The profits of the Society as distributed among shareholders were similarly astonishing. Since 1871 the Society had paid in dividends over \$11,000,000, and prior to that date a further large amount, of which he had no figures.

Twice during the last few years—in 1895 and 1903—the paid-up capital had been increased out of surplus profits, without any call whatever on shareholders, by doubling the value of the shares; the first time from \$25 to \$50 a share, and afterwards from \$50 to \$100 per share. These were bonuses which the shareholders of few companies had enjoyed, amounting as they did to three quarters of the value of the shares. That these large dividends and bonuses had not impaired the Society's security was manifest from the fact that during the last nine years its assets had been more than doubled.

The Society had from time to time extended the sphere of its operations by establishing branches in London, Shanghai, and other places in China, the Straits Settlements, Japan, India, Australia and New Zealand, Canada, and elsewhere. So that to-day the Society had actual branches scattered over the greater part of the world, and, of course agencies even more widely.

Mr. Ede, the General Manager, who had been connected with the Society for altogether thirty-four years, had, for the last ten years, been in charge of its affairs, and he (Mr. Sharp) might say that the period since Mr. Ede assumed control had been the period of the Society's greatest expansion and success.

This brief survey of its history and financial position showed that the Society had capital and assets amply sufficient for its present and proposed additional business. He would point out to His Lordship that the modern tendency was towards what he might term "composite" insurance companies. People who wanted to be insured in various ways naturally preferred an office that undertook insurance generally, rather than having

to get separate policies with different offices, each restricted to one kind of risk—marine risks, fire, accident, workmen's compensation, and employer's liability. All these kinds of insurance were now commonly done by the same company, although formerly only by separate companies. The companies with restricted objects were handicapped nowadays, and the older companies, like the Society, had been extending their objects, so as to compete on level terms with newer companies possessing wider powers; and the Courts at Home and in Hongkong had



UNION BUILDING, 4 THE BUND, SHANGHAI

sanctioned such enlargements. The proposed alteration extended the Society's objects of marine and fire insurance to all kinds of insurance except the issue of policies of life insurance, i. e. ordinary life insurance business, which the company did not ask for. In conclusion, the alteration would enable the Society to carry on its business more effectively, and to carry on certain business which, under existing circumstances, might conveniently and advantageously be combined with its present business. The application was granted.

# Philippine Health Service

[ANNUAL REPORT OF DR. J. D. LONG FOR FISCAL YEAR 1916]

The routine work of the Service was carried on in an entirely satisfactory manner, and all work was handled promptly. The various divisions of the Service coöperated splendidly and, almost without exception, real interest and enthusiasm in the work of the Service was constantly manifested by the various officers and employees. With the exception of cholera, no epidemic diseases were present in a manner to require much exertion for their control.

Cholera was present throughout the year, but assumed only slight proportion until the month of May, when in spite of all efforts to control it, it began to make its appearance in various places. A total of 12,847 cases and 7,986 deaths occurred in the Islands during the year. Of this total 1,214 cases and 513 deaths occurred in Manila and 11,633 cases and 7,473 deaths occurred in the various provinces. At the end of the year Manila was to all intents and purposes free, and only scattered cases remained in the provinces. Cholera during 1916 was somewhat unusual in its behavior, and as it was realized early that the situation presented serious aspects, extraordinary efforts were put forth, but all that could be accomplished was to hold the disease down to a minimum of cases and eradicate it as soon as possible, whenever it appeared. It was realized that conditions were likely to be serious for two reasons, namely, the disease would make its appearance practically simultaneously in widely separated places, places so widely separated that existing means of transportation could not have carried the infection from one place to another, a careful study of transportation facilities, schedules, etc., practically confirmed these facts; secondly, after the disease made its appearance in a place, while our measures were able to control the disease and prevent the occurrence of any great number of cases, or would promptly and effectively reduce the number of cases, to completely eradicate the disease was a difficult matter; cases would continue to crop up from time to time in ones and twos for quite a period after, in accordance with previous experience, the disease should have disappeared.

Due to the above facts it was practically agreed by all that it was essentially a "Carrier epidemic,"—that is, an epidemic started by cholera carriers and kept going, after the time it would ordinarily have been controlled, by cholera carriers. Study of the reports of the Manila division, of Bilibid prison, and of the provincial division will throw further light on this subject. It has been realized for some time that there is much still to be learned as to why cholera persists in the Philippines, and as to the reasons for its periodical appearance in epidemic form. Considerable valuable information was obtained in this regard during the year, but it is not as yet in sufficiently exact form to put it forth in the form of a definite statement.

Charts showing barometric pressures, atmospheric temperatures, and humidity as compared to cholera incidence, were prepared with the coöperation and assistance of the Weather Bureau, and are now being studied, there are apparently some related factors to be seen, but so far they are so elusive that nothing definite can be stated as yet; it may be, that there exist additional causative factors which must operate synchronously to produce a cholera outbreak, which have not as yet been suspected. The only definite and constant causative factor discovered so far is the constant presence of cholera carriers in the community. As a precautionary measure, a register is now being kept of the names and addresses of all recovered cases and known carriers of cholera, and they will be examined

from time to time in order to learn as far in advance as possible of the impending approach of an outbreak.

The work of the School of the Philippine Bureau of Science, and others, has demonstrated pretty conclusively that when a cholera carrier is given a severe purge or when he ingests food or other substances which have the effect of producing a severe purge, the carrier frequently is converted into an actual case. The usual history of the first case of cholera in a community is as follows: No cholera has been present for months possibly, an individual, usually one of the very poor class, has gone to work or fishing early in the morning, and has been exposed to the rain and has been thoroughly wet all day; upon his return home completely exhausted, soaked to the skin, and very hungry, he eats excessively of any food that happens to be in the house, as often as not rice and fish that very probably has been cooked in the morning and kept in a covered vessel all day; that night he has an attack of "cholera morbus," with vomiting and purging, cramps, etc., and the next day has cholera and probably dies; this is the usual focus from which the disease spreads throughout the town. Of course not every person that has an experience similar to the above develops cholera, but it is believed, that the majority or at least a large percentage of cholera carriers that have a similar experience are very likely to develop the disease.

An experience that would seem to be confirmatory of the above was had in the city of Manila during November and December. There had been no cholera in the city since November 14; on the 28th two cases occurred, on the 29th four cases, on the 30th sixteen cases, on December 1 eighteen cases, on December 2 fifty-six cases. This rapid increase pointed to some infected food in general use as the probable causative agent. The markets were at once investigated and it was learned that on the 27th and 28th of November unusual quantities of shrimp and small fish had appeared in the markets; they soon began to decompose and the sanitary inspectors ordered their condemnation and destruction; this was the signal for the fish vendors to lower their prices so as to unload their stock promptly and thus avoid loss; the poorer class of course bought extensively; as soon as these facts were definitely known on December 3, the sale of shrimp and shell fish was strictly prohibited and stocks wherever found were confiscated and destroyed; the result was at once apparent; December 3 had fifty-one cases; December 4, twenty-eight; December 5, twenty; December 6, five; December 7, six; December 8, five; December 9, four; and so on till the disease gradually disappeared. Total, 215 cases in twelve days.

The city of Manila has a population of (Health Census, 1914) 266,943; the average number of cholera carriers found during 1916 was .67 per cent in 243,974 examinations; there were then presumably about 1,634 carriers in Manila; it is presumed that ptomaine poisoning occurring among these carriers acted as the purge which converted a number into cases; it is known that numbers of ptomaine cases occurred which did not develop cholera. Bacteriological confirmation of many of the cases was lacking, supposedly due to the excessive purging and the rush attendant upon such a sudden influx of cases; the clinical indications were marked, collapse and suppression of urine being especially prominent, the average mortality was about 30 per cent in the final analysis, which conforms very closely to the usual cholera mortality in San Lazaro, in cases arriving in

a living condition. The unprecedented catch of fish and shrimp, and their prompt putrefaction was later accounted for by the fact that on November 27, 28, and 29 the bay was invaded over very extensive areas by an infusorium known as peridinium, which either stupefied or killed the fish in such enormous quantities that fishermen stated they were able to skim them from the surface in basketfuls, probably already in the beginning stages of decomposition.

## Features in the Control of Cholera

Early in the outbreak it was decided to establish temporary emergency cholera hospitals as a means of removing foci (cases) of infections to a common center where they could be effectively controlled, and also for the purpose of reducing mortality. Considerable hesitation and doubt as to the efficacy of the measure was generally expressed, as the people generally did not take kindly to hospitalization. The first experiment was made in Hagonoy, Bulacan, until then a very backward and recalcitrant town; preliminary opposition was overcome by forcible hospitalization, at the same time public addresses were made by the Assistant Director of Health, the provincial governor, the various health officers, and others; fortunately the first cases made good recoveries, and suddenly a voluntary influx of cases began, with the result that the epidemic was promptly controlled, with an average mortality of about 45 per cent as compared to 75 per cent or 80 per cent in previous outbreaks.

The remote results were beyond all expectations; emergency hospitals sprang up wherever cholera appeared, with excellent results; the people were convinced and voluntarily reported themselves or their sick all over the Islands. It is known that in Manila alone, well over 50 per cent of the cases either presented themselves on foot, in street conveyances, and on street cars, or else notified the health stations or the hospital itself so that ambulances could be sent.

Had such coöperation not been had, it is almost a certainty that, taking into consideration the character of the outbreak, as previously explained, it would have assumed much more serious proportions.

Hagonoy itself has experienced a sanitary renaissance; a sanitary commission has given the town a thorough investigation, sanitary ordinances for sewage and waste disposal have been enacted, and the town is now going into the question of prevention of infant mortality and a complete sanitary and economic renovation.

The two sanitary commissions, all that the Service has been able to support, have, since June, 1915, when the first one was formed, practically completed a detailed study of ten towns of the Islands. Their labors have been productive of excellent results, in that confirmation has been had of many things formerly suspected but not definitely known, and new and unsuspected facts have been learned which are continuously operative to keep up the mortality rate, especially as regards infant mortality. As a direct result of their efforts, the people have learned that many afflictions, which have heretofore been accepted as inevitable, are preventable and curable. Sanitary ordinances, even in towns that the commissions have not visited as yet, have been enacted and are being enforced, especially as regards sewage and waste disposal, and it is known that over 6,000 "Antipolo systems" of sewage disposal have been installed; this means that over 30,000 people are now using sanitary systems of sewage disposal, that formerly had none.

In Pasig alone it is known that over 100 babies less died last year than formerly. Mothers are taking more interest in the care and welfare of their children, and are also doing what they can to furnish a better balanced diet for the entire family. As a further by-product of the efforts of the commissions, 57 women's clubs are known to have been formed, dedicated to the prevention of infant mortality, to better housing for the people, and to the inculcation of better balanced diets. With this end in view almost 15,000 families agreed to maintain vegetable gardens, with a view to adding protein producing vegetables to the almost universal diet, among the poorer classes, of rice and fish, thus bringing about a better physiological balance than now exists.

It is a well-known fact that the average Filipino has no reserve of vitality, or as the engineers put it, no factor of safety. If he is overloaded in any way, as by exposure, a slight infection, or fever, he breaks under the load, becomes sick, and has to go to bed. If a reserve of vitality or factor of safety can be created, the results will be far reaching, in that morbidity and mortality, both adult and infant, will be reduced, mothers can give their children more and better breast milk, beriberi will disappear, and a much stronger, healthier, more ambitious and more numerous race will result. In view of the results that can and are to be obtained by these procedures, for a small and absolutely insignificant outlay compared to the benefits to be derived, it is not understood why more money is not appropriated, and why so much difficulty was encountered in obtaining a small appropriation for 1916, P.35,000, for 1917, P.30,000, with the intimation that there would probably be none forthcoming for the fiscal year 1918. Thanks are due to His Excellency the Governor-General for his positive insistence upon the inclusion of an appropriation in the 1917 appropriation of a sum at least approximately equal to that for 1916.

#### Sanitary Houses

The researches of the sanitary commissions indicated early in their existence, the necessity for a better house than the average Filipino now possesses. The average house now in use is made of nipa and bamboo, affords inadequate shelter from the elements, is too small for an average family, is a continual expense on account of its frail nature, and is continually in danger of destruction by fire, due to its tinderlike make-up. Almost two years were given to a study of this problem; the first attempt was a failure, due to our ignorance of the properties of bamboo, of which the first house was constructed; the next attempt, however, was a success, and it is now possible to build a house that is sufficiently large for the average family, that is neat in appearance, durable, fireproof, sanitary in all respects, cool and comfortable, for an average cost of P.500 to P.600 (\$250 to \$300 U. S. currency) of materials locally available, by a method of construction so simple that any average carpenter can build it, after having watched the construction of one of them for a short period of time.

A bulletin giving plans, specifications, methods of construction, etc., is now in preparation and will shortly be available for general distribution. It is felt that the people are interested and that it will be a reasonably short time only till the type will become general. The system of construction readily adapts itself not only to dwelling houses, but to other types of construction as well, such as schoolhouses, churches, storehouses, etc.

Our statistics show that there are 4,466 insane in the Islands, of these hardly 1,000 are under proper restraint and care; the great majority are cases of the maniac-depressive type of insanity, probably due, as many authorities now believe, to chronic intoxications resulting from chronic infections, as fevers, malaria, etc., and to prolonged and repeated food poisonings, due to improper and poorly balanced diets. As confirmatory of this hypothesis it may be stated that about 60

per cent of those of this type admitted to San Lozano Hospital are discharged recovered, the treatment consisting of properly balanced food, baths, purgation, and removal of intestinal parasites. A prolonged study is now being made of these cases; the results so far obtained are promising and it is hoped that something definite can be worked out; meanwhile additional buildings should be provided for proper housing and treatment of these unfortunates.

#### Culion Leper Colony

The leper colony at Culion has had many improvements during the past year, and is now in a fairly satisfactory condition, though more improvement especially as to housing of the inmates is needed. The average leper population has been between 4,100 and 4,300.

It is encouraging to note that the lepers are taking much more interest in life, and are showing much more activity; for example, an ice plant has been constructed with leper capital, all the fish used are caught by the lepers, and almost all the vegetables used are raised by them; they are paid current prices for their products; in this way profit accrues to them and economy to the government, as transportation and handling charges are eliminated, and there is but little loss or depreciation of products, quite a considerable item in a year. Practically the only articles sent to the colony now are clothing and rice; groceries, etc., are sent to the Culion store and sold to the lepers at cost, plus a small percentage to cover freight, loss, depreciation, and handling.

Artesian wells to supplement the water supply have been drilled. A sanitary barrio has been laid out to relieve congestion in the populated area, and additional hospital facilities have been supplied.

While there have been but few cases of actual smallpox during the year, the number of cases of varioloid, practically without deaths, has increased; this is interpreted to mean that the immunity obtained by the general vaccination began in 1905 and 1906 has begun to wane. Revaccination will be started at once, and it is hoped to re-establish immunity before that formerly gained is entirely lost.

Satisfactory progress has been made in the filling of lowlands and tidal areas in the city of Manila, and with the interest now being manifested, it is believed that even more progress will be made during the coming year. It will be noted that an additional division has been created in the Bureau by the inclusion of Health Activities in the Department of Mindanao and Sulu. The chief of the division, Dr. Jacobo Fajardo, former chief health officer for the Department of Mindanao and Sulu, maintains his headquarters at Zamboanga, in order to facilitate the work of his division.

## Continuous Photo-Printing Machine

Herewith is illustrated a continuous photo-printing machine, used in conjunction with an automatic washing and drying machine, both of which were designed and constructed by the C. F. Pease Company, of 213-231 Institute Place, Chicago, Illinois, U.S.A., and are sold under the trade name "Peerless." With these machines a single operator can print, wash, and dry 100 linear yards of blue prints per hour, during which time the apparatus consumes 7 units of electrical energy, 60 gallons of water, and 50 cu. ft. of gas. It is, of course, quite possible to use the machine for part of the time only if such a large output is not required when

the working costs are correspondingly reduced. Prints can also be made on separate sheets instead of continuous rolls, if desired.

The table from which the tracings are fed into the machine has beneath it two horizontal spindles which carry rolls of sensitized paper of different widths. The tracings and paper are carried upwards over a cylindrical segment of thick plate glass by means of an endless canvas belt. Springs are provided to keep the belt tight, so as to insure good contact, and side travel of the belt is prevented by a special device. The belt is driven by a small electric motor, the speed of which is controlled by a rheostat placed on the right-hand side of the machine. By means of the rheostat, the speed of the paper can be varied from four inches per minute, which allows sufficient exposure for the slowest negatives and black-line prints, up to six feet per minute.

The exposed paper can be examined immediately it has passed the glass segment, so that the speed can be adjusted to give the right exposure before any prints have been spoilt. In front of the glass is a bank of five arc lamps, of the inclosed type, fitted with aluminum reflectors. Each lamp is separately wired and controlled by switches, which are inclosed in a metal box on the left-hand side of the machine. The number of lamps employed can thus be varied according to the width of paper being used. The motor switches are also

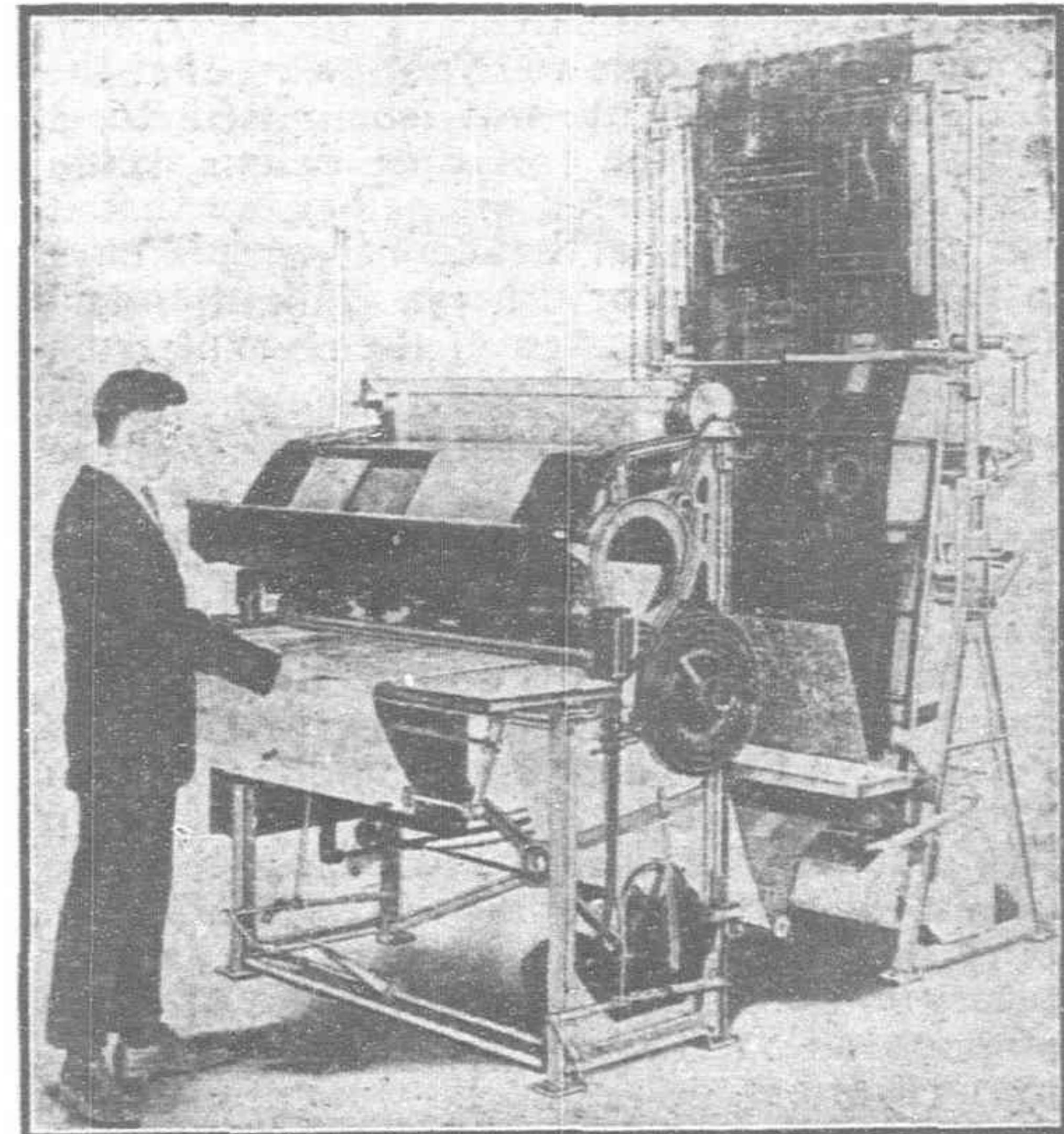


PHOTO-PRINTING MACHINE

inclosed in the same box, and all the wiring is incased in steel tubing. A small electric fan of the pedestal type is mounted on top of the switch box. This fan drives a current of air in a transverse direction through the machine, in order to carry away the heat from the lamps.

After printing, the tracings are delivered into an enameled iron trough in front of the machine, so that the operator can remove them without changing his position. This trough also serves to catch the expositive paper if the printing machine is used independently of the washing and drying equipment. Usually, however, the exposed paper passes over a roller at the top of the printing machine, and thence to the washing and drying machine. This part of the apparatus is driven, by means of chains and sprocket wheels, from the motor of the printing machine, and in it the paper is first washed by a spray of pure water, and afterwards treated by a weak solution of potassium bichromate. This solution is contained in a galvanized tank placed in the base of the machine and is circulated by a small rotary pump. After a further washing with pure water, the paper passes upwards in front of the drying device. Here it passes through a device for rolling up the finished prints. The makers state that no device for removing wrinkles is necessary, as the drying takes place so evenly that none is formed.

# Federated Malay States Public Works Improvement Budget

In moving the reading of the Supply Bill for 1918, the Chief Secretary of the Federated Malay States dealing with estimates of revenue for 1918, totaling \$54,353,934, said that the estimated tin duty (\$7,144,400) had been based on a price of \$87 per pikul. That price was fixed in the month of June, when tin had gone up to \$113 and was going down rather rapidly, and compared with present prices the estimate might be taken as a very conservative one. The estimated output for the year was 618,000 pikuls. Rubber, estimated to produce \$5,911,383, was fixed at 2s. 4d. for 96,000 tons, and having regard to the price and also to the difficulty of shipping rubber to Europe, it would probably be safe to keep it at that figure. With a revenue which depended on the prices of commodities such as tin and rubber it was most difficult to prophesy what prices were likely to be a year ahead, and for that reason most States thought it better to underestimate rather than to overestimate.

The chandu (opium) revenue for next year was estimated to amount to \$11,330,000. He thought it advisable to remind the people of the country that that was a precarious source of revenue. It amounted to at least one fifth of the revenue estimated for the year, and probably some people were not aware that the British Government was committed to a policy by which the traffic in opium would eventually be eliminated altogether, so that it was quite certain that that country would have to face some time or other a diminution and probably a total cessation of the revenue from that source.

Turning to the total estimated expenditure for 1918 (\$53,976,131), the Chief Secretary said that it might be considered bold of the Government that in times like these it should even propose an expenditure of so large a sum as 54 millions of dollars during 1918. But even this sum would be increased, as he would have to propose in committee certain rather considerable additions, the chief being \$892,120 for the war bonus, bringing the estimated expenditure up to 55 millions. They proposed to spend a very large sum of money in 1918 on the improvement of their communications. There was no excuse needed for proceeding with such works even in time of war.

They proposed to spend, out of the total of 54 millions, over 26½ millions under the heading of railways, and of that total 17½ millions was non-recurrent expenditure, that was to say, construction and non-recurrent services.

Under police there was an increase of \$31,718 to \$1,448,490.

For the Medical Department the estimated cost was \$1,970,571, which exceeded the provision for 1917 by \$72,127.

Education called for \$654,717, exclusive of works and buildings, on which a considerable sum would be spent. There was an increased demand for education in the country, and consequently they were making an effort now to improve the Malay vernacular schools. It was the intention to establish a training school for vernacular teachers, as a memorial of the late Sultan Idris. A site had been selected at Tanjong Malim, and plans and estimates were now being prepared to provide accommodation for 200. In addition provision was made for an artisans' school, also for Malays.

Under surveys there was an increase of \$119,695, the total estimated being \$1,379,775. The arrears of work in the Survey Department were very heavy indeed, owing to the tremendous demand for land and also the shortness of staff owing to the men having gone to the war.

Under Posts and Telegraphs they asked for an increase of \$62,573 and \$100,000 was pro-

vided for the erection of new poles on the Gemas-Johore Bharu section, a very necessary work.

For the Agricultural Department the estimate was \$518,982, an increase of \$45,236. The total amount estimated to be expended on Government plantations was \$215,700, in addition to the \$60,000 for the recently purchased coconut plantation. In that connection he might mention that the sale of rubber produced on the various plantations controlled by the Agricultural Department was estimated to bring in \$334,000.

In connection with the Agricultural Department Government had had under consideration for some time the question of improving the rubber trees of this country by a process of seed selection. That was a work which was considered to be of primary importance in this country, and in order that this work might be carried on it was proposed to engage three new officers specially trained to carry out experiments in seed selection and plant breeding, a geneticist or plant breeder, another mycologist and a physiologist.

## Railway Expansion

They now came to railways, which accounted for a large portion of the estimated expenditure next year. The amount the General Manager asked for was \$26,515,943.

Out of a total estimated expenditure on capital account of \$6,809,854 there was an item for rolling stock of \$4,222,291, of which more than two millions was locomotives. A considerable portion of this consisted of revotes, and unless the war ended next year there was a great possibility that they would not be able to obtain a considerable portion of that rolling stock. He need hardly say that prices had enormously increased. For instance, locomotives which before the war cost £4,000 were now estimated to cost in England £7,200, while in a foreign country where they made an inquiry the cheapest was £8,200. Under manufacturing and repairing works and plant a sum of \$168,000 was proposed to be spent for a much needed extension of the machine shop at the Central Workshops. A considerable sum was necessary for quarters for officers and staff, and in this connection he might say that taking the whole of the estimates for public works, they provided about one million dollars next year for quarters for officers and staff, especially for the menial staff of the Railway Department.

There was estimated to be spent on construction in 1918 a sum of \$9,706,000. It had been decided to recommence construction on the Kelantan Railway, and a million dollars was inserted for the Kelantan section and another million for the Pahang section. Although rails and other material could not be obtained, and probably would not be obtained next year, it was possible to go on with the earth work and the abutments for bridges. The Perlis section was approaching completion, and at the beginning of next year the staff and a large labor force would be requiring work. It would be much more economical to transfer that staff and labor elsewhere than to disband them and then afterwards have to recruit the labor and get it together again.

## Two Millions for Prai

In connection with Prai a first vote of \$2,000,000 was inserted. The consulting engineers' report on these works had already been generally approved by the Council. Steps were being taken to acquire the necessary land. Since the last Council meeting a tender had been received from Messrs. Topham, Jones, and Railton for doing the work for a certain price—very little under £1,000,000. The consulting engineers had recommended the acceptance of this tender,

the only alternative being to wait until the war was over. It had been decided that that tender be accepted. He should mention that another firm invited to tender said that they were not in a position to do it at all. In addition to the works on contract at Prai there would, of course, be very considerable works required in order to make a port there, such as warehouses and electric plant to deal with cargo and coaling steamers, and it was estimated that altogether the total amount which would be expended on Prai would be thirteen million dollars, spread over a period of five or six years.

The next item in the estimates was \$1,500,000 for a causeway over the Johore Straits. Originally it was intended to construct a bridge from Woodlands to Johore Bharu, and an investigation was carried through to ascertain whether good foundations could be found for a bridge. They proved that foundations at those spots at any rate were not at all satisfactory. In the meantime a suggestion was made that instead of a bridge they should have a rubble causeway, and he would like to place it on record that Mr. W. Eyre Kenney was responsible for that suggestion. At the Woodlands end of the causeway there would be a lock capable of admitting a vessel 120 feet long. The causeway was to carry a double line of rails, and provision would also be made for a carriage road. The extra cost involved by the latter the Colonial Government and the Government of Johore had consented to share, but until they knew the cost of the whole undertaking it was impossible to state what such shares would be. As soon as particulars had been obtained the figures would be communicated to the Council. The work was estimated to take from four to five years. With regard to this work also it was suggested they should invite tenders. The only alternative, as in the case of Prai, was to defer carrying out the work until the end of the war.

Other works which it was proposed to undertake were a new engine shed, carriage shed, and goods yard at Ipoh, loco. depot at Kuala Lumpur, each to cost \$250,000, and new carriage and engine accommodation at Seremban. The General Manager had been engaged for some time past in preparing comprehensive schemes for laying out goods yards at Kuala Lumpur, Ipoh, and Seremban.

They were also proposing a large expenditure on doubling the line from Singapore to Woodlands and the construction of a terminal station in Singapore. The doubling of the Port Swettenham line was also a work which could not be very much longer postponed, and \$100,000 was placed in the estimates to purchase the necessary land. It was considered necessary to extend the doubling of the line to Batu Junction. As to the proposed small branch line from Ipoh to Gopeng, the opportunity might be taken of purchasing the necessary land, and provision was made for that.

Other works were a channel for the Kranji River below Kampar, which was said to be in danger of floods, for shore protection at Bagan Datoh, and for drainage of Teluk Anson. Under roads, provision was made for the extension of the Kuala Kangsar to Kuala Kenas roads, a road from Kampar to Chikus and improvement of the Bagan Datoh road. In Lower Perak provision was made for irrigation work at Brieh and in Kuala Kangsar. In Selangor provision was made for the improvement of drainage in the Kapar district and for the improvement of the Sungai Buloh waterway. In Negri Sembilan provision was made for small water installations at Gemas and Rembau and for English schools at Port Dickson and Kuala Pilah, and for continuation of work on the Tampin-Gemas road, which had been commenced this year.

# The Tea Trade of China

[BY AMERICAN VICE CONSUL RAYMOND C. MACKAY, HANKOW]

The most important article of export from Hankow, and, in fact, one of the most important for all China, is tea. This product, locally called *ch'a*, was known as early as 400 B.C., but it is reported that it did not come into general use until about 700 A.D. The earliest use of tea was not as a beverage, but as a vegetable dish, and even to-day in Tibet the ordinary everyday meal consists of a doughy mass made of tea, barley meal, butter, and salt. Since the eighth century the demand for tea has become world-wide, and in China, its place of origin, the annual consumption is now estimated to be five pounds per inhabitant.

The great tea-growing districts of China are by no means so widespread as is generally supposed. The plant flourishes best between the latitudes of  $26^{\circ}$  and  $30^{\circ}$ , and its quality depends very largely on the altitudes at which it is grown. For example, the celebrated black tea from Anhwei is produced on the slopes of the Li Mountains at an altitude of over 3,000 feet, while the famous "Hsienya" tea comes from even greater heights in the mountains of Kiangsi. Hunan, Hupeh, Fukien, Kiangsi, Anhwei, Chekiang, Kwangtung, and Yunnan are the chief tea-producing provinces of China. Hunan exports the greatest quantity destined for foreign countries, but Anhwei's output is considered superior in quality.

During the last twenty-five or thirty years China's export trade in tea has fallen off to a large extent, primarily because of a lack of cooperation among the growers, the employment of antiquated methods in the plant's production, heavy taxation, and, somewhat of late, to disturbed political conditions in the regions where the plant is cultivated. India and Ceylon during the last sixty years have gradually won much of the trade away from China, until to-day they are supplying the bulk of the world's demand, especially for the coarser and darker-colored teas. This is in spite of the acknowledged fact that Chinese teas are superior to all others in their delicacy of flavor. During the last ten years, however, China has begun to realize the extreme importance of retaining this trade, and Government measures have been adopted in an effort to regain its old-time prestige.

The following table prepared by Mr. A. Pellens shows the relative chemical compositions of China, Java, and Indian teas:

Teas	Water	Tannin	Water extract	Total	Ash	Ash soluble in water
Congo (Ning-chow, China)	4.575	8.070	36.05	5.320	4.045	
Java (Batavia)	4.580	9.704	42.75	5.050	3.150	
Orange Pekoe (Calcutta, India) .....	4.576	9.436	43.75	5.420	3.520	

In addition to the above there is also a content of 2.50 per cent tannin in the China product, 2.53 in the Java, and 3.21 in the Indian. The low percentage of tannin in the Chinese product as compared with the others is specially to be noted.

As stated before, the altitude at which the tea plant is grown is of prime importance in the determination of the resulting product, the finest grades being cultivated at elevations of 3,000 to 4,000 feet. Naturally, the character of the soil is also a very large factor, for unless it contains the proper elements, climate and correct elevation will be of no avail. Growers of the plant state that the soil best suited for its cultivation is a clay and sand mixture having a high percentage of organic matter. This loam is formed by the decomposition of a porphyritic sandstone which is found over large areas in certain parts of

China. En-Lung Hsieh, an authority on tea cultivation, gives the following chemical analysis of the soil of the famous Keemun district of Anhwei province; the high percentage of organic matter and iron oxide is to be noted: Water, 2.41 per cent; loss in ignition, 6.58; substance insoluble in HCl, 80.453; silica, 1.002; iron oxide, 4.48; alumina, 6.22; lime, 0.20; magnesia, 0.221; potash, 0.161; soda, 0.336; sulphuric acid, 0.117; phosphoric acid, 0.2035; carbon, 4.330; nitrogen, 0.1356; humus matter, 2.041.

Tea is usually grown on small farms located on the slopes of hills and never on large plantations. Each family does its own cultivating, picking, and drying. When prices are not prohibitive bean and rapeseed cakes are used as fertilizers. Wood ashes are also used as a fertilizer. As a general thing, these products are applied to the fields in February; and during the next month, when the young sprouts begin to appear, the corn husks, which have been placed around the plant as a shield from the weather, are removed and the ground hoed and cleared of weeds. The first picking of the tea leaves usually occurs in early April, the second in May, and the third and last in August. The land is then plowed and harrowed, after which it is allowed to remain untouched during the winter months.

The tea-picking season extends over a period of about four months. The first crop, which is gathered in April, is always the most valuable. In some sections the leaves are covered with a downy growth, and this output, known as "Pekoe," is considered one of the best grades of Chinese tea. The bushes continue to put forth leaves; but, as a rule, the natives pick too heavily at the beginning of the season, and the result is that the second crop is of a far coarser variety and suitable only in supplying the demand for cheap and poor quality teas. The late Mr. J. H. Wade, a noted Shanghai authority, gives the following classification of Chinese teas:

*Black Teas.*—Anhwei province—Keemun; Kiangsi province—Ningchow and Moning; Hupeh province—Copacks, Sungyang, Yung-louting, Tongsan, Ichang, and Cheongshukai; Hunan province—Oonahms, Oanfa, Liling, Nipkasee, Wunkai, Lowyong, and Shuntam; Fukien province—Congou, Packlum, Sou-chong, Soomoo, Suey Kuts, and Oolong. The blends of these are known as Scented Capers, Scented Orange Pekoe, Pouchong, Kooloo, and Flowery Pekoe.

*Green Teas.*—Anhwei province—Moyune, Tienkai, and Fychow; Chekiang province—Pingsuey, Hoochow, and Wenchow. These make the blends known as Sowmee (also known as "Shanghai Packed"), Gunpowder (Siaou Chu small leaf), Imperial (Ta Chu large leaf), Hyson, Young Hyson, Hyson Skin, and Twankay.

There are five distinct processes in the manufacture of tea—withering, rolling, fermenting, firing, and sifting. As the name signifies, the withering process consists in drying the leaf, which is usually accomplished by simply laying the plucked leaves out in the sunshine on straw mats and occasionally turning them so that they dry evenly on all sides. Under this treatment the tea gradually darkens in color. When a rich green stage is reached tests are made to see that the drying is not carried to a point where the leaves become brittle. When the weather forbids outdoor drying, the withering is accomplished in artificially heated rooms; care being taken to see that all stale air and gases are promptly removed from the drying chamber.

The second process, known as rolling, is really a further stage in the withering process,

as its object is to squeeze any remaining moisture or sap from the leaf. In India and Ceylon this work is usually done by machinery, which not only expresses all the moisture from the leaf but gives it the proper twist. In China, however, this is done by hand, the product being placed on wicker or bamboo trays and rolled backward and forward with the palms of the hands for a period ranging from thirty minutes to an hour.

The third, or fermentation, process determines whether the product is to become black tea or green. At this stage in the preparation of the tea the leaves are placed on some flat surface and covered with a damp cloth. The process is sometimes hurried in another way, that being the use of covered wicker baskets under which a slow fire is built. This treatment, which usually requires from two to six hours (depending on the weather and on the methods used), is terminated when the leaf takes on a copperish tinge. If green tea is desired, the fermentation is either done away with entirely or checked before any change in the color of the leaf occurs.

The most important stage in the preparation of the tea is that of firing, for the flavor of the product is determined in this process. In India and Ceylon the firing of the tea is accomplished by placing it on wire trays, which are then transferred to large desiccators through which passes a blast of air heated to  $210^{\circ}$  or  $220^{\circ}$ . In China the methods employed are very crude. A basket measuring about 30 inches in diameter, 3 feet high, open at both ends, and having a light bamboo bottom placed halfway of the basket is the most common receptacle used for firing. The tea leaves are placed in the upper half and a charcoal fire is built below. In this manner all remaining moisture is driven off and the desired flavor given to the tea. When an artificially scented product is desired a variety of jasmine flower is fired with the tea. The same fragrance may also be imparted in a lesser degree by sprinkling the tea with the flower after packing, but this method is followed only in the manufacture of inferior teas.

The fifth and last process is the sifting and grading of the tea, which is accomplished by means of sieves, each smaller in mesh than the preceding one, a careful grading of the tea taking place after each sifting.

The manufacture of brick tea was first attempted in Foochow in the early seventies. This product is made by pressing tea leaves or tea dust into cakes approximately 10 inches in length, 8 inches in width, and 1 inch in thickness. Foochow's trade in this article prospered until the nineties, when the superior manufacturing and shipping facilities of the Yangtze Valley swung the trade to the Russian firms whose factories were located at Kiukiang and Hankow. In consequence Foochow now has but a very small proportion of the brick-tea trade, Hankow manufacturing the vast bulk of the output, with Kiukiang second, and Foochow a very poor third. Russia has always been practically the only consumer of this product.

The methods by which brick tea is manufactured in the large factories of Hankow are scientific and up to date. Automatic stokers for the furnaces, late designs in the type of engines used, hydraulic presses, and the like, evidence the fact that, in spite of the extremely low cost of labor, in many instances it is far more satisfactory and economical to use modern machinery. Especially is this attitude shown by the use of automatic stokers.

The process by which the bricks are manufactured is rather simple. Lead molds made up in elaborate designs and heavily bound with

steel are placed in presses. A thin layer of steaming high grade tea is then put into the mold, followed by a thicker layer of a coarser grade, and lastly by another thin layer of the first grade. The top part of the mold is then put in place and the whole subjected to a heavy hydraulic pressure. The molds are then removed from the presses, and after cooling for a period ranging from a few hours to several days and even weeks (for this is in reality a drying process) the bricks are ready to be packed in bamboo baskets and shipped to Russian ports for distribution. The average basket contains 80 bricks and has a net weight of 200 pounds and a gross weight of 222 pounds and at present costs approximately 60 taels, or \$4.52 United States currency at exchange of \$0.6921.

The above process is typical of that in use in most brick-tea factories, the only variation being in the grade of tea used. Foochow's product is made largely of tea dust and in consequence is inferior to that made from tea leaf or even fannings.

A product very similar to brick tea is tablet tea. This article is also compressed tea, but differs in that it is usually made of a higher grade leaf and is not steamed in the making. It is also put up in the form of cubes or tablets, a far more convenient form for table use. The tablets weigh approximately one fourth of a pound, are wrapped first in tin foil and then in a fancy paper covering, and are usually packed in lots of 500, which sell for 30 to 40 taels (\$20.70 to \$27.68 United States currency). In 1914 there were 1,619,367 pounds of tablet tea, valued at \$164,335 gold, exported to foreign countries; 4,094,933 pounds, valued at \$470,353, in 1915; and 3,106,000 pounds, valued at \$447,305, in 1916. Hankow and Kiukiang are the only two manufacturing centers for this product, and as in the case of brick tea, Russia is the sole consumer.

Local tea merchants state that the past tea season will long be remembered for the numerous difficulties which beset the trade. Lack of shipping facilities and the resulting high freight rates, together with the distinctly inferior crop as compared with that of 1915, made the season a disastrous one for the native dealers. Foreign tea merchants had what may be termed a fair season in spite of their many difficulties.

In the case of black teas the high exchange and lack of shipping space prevented large sales from being made until fully three days after the crop arrived on the market. Then the Russian dealers forced prices up by buying practically the entire output of the Keemen district, the market opening at 50 taels per picul (\$34.60 gold per 133½ pounds). From this point prices fell until October, when the small remaining stock was sold at a low figure. The Hankow crop for 1916 is estimated at 672,000 half chests, against an output of approximately 917,000 half chests in the previous year.

As a result of the heavy rains during the spring of 1916 all of the crops, with the exception of Ningchows, were distinctly below average, especially in style and infusions. Green teas were far below average in quality, and the price of uncolored "chops" was very high, due to the small quantities on the market.

One of the large local tea firms reports: "Stocks in consuming countries were small at the opening, and, notwithstanding high exchange and freights, demand has been brisk the whole season. Chunmees have been in especial request; and though supplies have been 50 per cent larger than usual for the lower grades and normal for better kinds, tea men have been able to obtain very good prices. Foongmees have met with fair competition, especially Fychow kinds. Points have been more or less neglected except for the finer grades. Gunpowders were not wanted at the opening; but late in the season a brisk demand set in and prices rose rapidly."

Hysons met a fair demand throughout the season, especially the better grades.

Hoochows and Pingsueys arrived late on the market and but little business was done until the middle of July. Prices gradually dropped until the middle of August, when it became apparent that there would be a small crop, and from then on the prices steadily rose until October.

Ningchows were lacking in quality, but their thick cup made them sell at prices ranging from \$18 to \$38 per picul.

Oanfas were inferior to last year's crop, but as they showed great strength in the cup, they were taken by the Russian buyers at prices ranging from \$17.30 to \$31.15 per picul.

Shantaams were readily taken for United States standard, the market opening at \$16.60 per picul.

In the past the tea trade of China has been laboring under heavy difficulties which only of recent years have been appreciated by the Central Government. Unscientific methods of cultivation and heavy taxation have been the chief obstacles in the way of the trade's growth. Living a more or less hand-to-mouth existence, the pressing needs of the moment have never permitted the Chinese farmer to pick sparingly, to fertilize and prune properly, and to have nurseries in order that old, worn-out plants might be replaced. The inherent superiority of the Chinese product has enabled the local farmer to continue his cultivation of tea; but had the growers of India and Ceylon been competing to supply the same quality tea, China would long ago have been left hopelessly in the rear.

This state of affairs is due entirely to the fact that Ceylonese and Indian growers are working their plantations under highly scientific instruction while the Chinese are not. What the latter need is some concerted action on the part of the growers and shippers in order that the output be distributed and sold in a manner advantageous to both buyer and seller. In the past the prices have fluctuated out of all proportion to any real change in the market, and huge shipments have been made to foreign ports totally unable to consume such quantities. The resulting conditions, chief among which is the absolute inability to control prices, have driven the Chinese trade into the background. In India and Ceylon the growers do not act as individuals, but as an organized unit that, as the exigencies of the case demand, regulates the output, shipment, and price of the tea on the London market. It is but natural that, working with a definite object in view and using scientific methods, the Indian trade would flourish at the expense of the Chinese, which is largely determined by the caprice of the individual. However, as before stated, China has at last realized the importance of at least attempting to regain its position as the chief source of the world's supply of tea and to this end has established an agricultural commission with the betterment of the tea trade as its main object.

The first step in this direction was taken in 1905, when an investigating committee was sent to India and Ceylon in order to study the methods practiced by the tea growers of that region. As a result of this movement a school was established at Nanking where the latest methods of tea culture were taught. In 1915 Chow Tsz-Chi was appointed Minister of Agriculture and during his short directorship he succeeded in giving the agricultural industries of the country a tremendous impetus. His plans for improving the tea industry consisted of the establishment of experiment stations, the subsidizing of certain tea planters, and a reduction in the export duty on the product.

In connection with the first of the above plans a station was established in the famous Keemen district in the Province of Anhwei where the growing of the tea plant under scientific methods is now being demonstrated

to the planters of that region. It is proposed that substations in the same district be rapidly established under the leadership of Chinese who have demonstrated their knowledge of modern methods of tea culture. As soon as the growers of this particular region have been made thoroughly acquainted with the new work the stations will be transferred to other tea-growing districts, where the process will be repeated. It is also planned to subsidize certain planters who have demonstrated their knowledge of tea growing under the methods prescribed by the Department of Agriculture in order that they may be given substantial encouragement toward carrying the work forward.

Lastly, a 20 per cent reduction in the export duty on tea was put into effect during 1915. While this step materially aided the growers, the Chinese Government will have to take further action along this same line in order that Chinese tea may meet the competition of Indian leaf, for in India there is no tax on either the production or the exportation of tea. The Chinese grower is under the further burden of having to pay a series of transit taxes known as likin which are levied on the article from the place of production to the place of shipment. These taxes often amount to more than the original export tax. It is thus evident under what great disadvantages the Chinese producer works as compared with his Indian neighbor.

When these plans, which are excellent in conception although not entirely comprehensive, have been put into effect, together with the improvements which naturally follow the working out of any new order, China will at last be on the road toward regaining its position as the main source of supply for the tea trade of the world.

## Japan Cotton Spinning Profits

The table shows the rate of net profits on the paid-up capital and the dividend for last term of the principal spinning companies together with the corresponding figures for the present term, either estimated or already informally decided:

	Last Term	Present Term
	Per cent	Per cent
	Profit	Dividend
Kanegafuchi ...	80	40
Toyo ...	65	35
Settsu ...	90	60
Amagasaki ...	100	90
Godō ...	47	40
Faji ...	70	48

The Nippon Menka Kaisha (Japan Cotton Company) has decided to pay a dividend of 100 per cent for the last term, the statement of accounts being as follows:

Profit ...	... Y5,274,956
Brought forward ...	... 215,240

Total ...	... Y3,490,196
To reserve ...	... 560,000
Reserve for equalizing dividends ...	420,000
Special reserve ...	420,000
Pension fund ...	50,000
Bonuses ...	250,000
Dividend, 20 per cent ...	312,500
Extra dividend, 20 per cent ...	312,500
Commemoration dividend, 60 per cent ...	937,500
Carried forward ...	227,696

The "commemoration" dividend is by way of commemorating the twenty-fifth anniversary of the Company.

# Development and Prospects of Japan's Chemical Industries

## What the War Has Done for Japan

[By DR. T. KAMOI, PROFESSOR, IMPERIAL UNIVERSITY, TOKYO]

While it is true that the chemical industry of Japan has developed remarkably, due to the war, it is very regrettable to note that the imports of chemicals still exceed the exports. The following table exhibits a comparison between the imports and exports of chemicals in 1913 and 1916 (three figures omitted):

Kind No.	EXPORTS		IMPORTS		EXCESS OF IM.
	Value Yen.	Kind No.	Value Yen.	Value Yen.	
1913 33	68,992	58	148,457	79,465	Excess Im.
1916 37	137,127	65	142,036	5,908	"

It will be noted that for 1913 the excess of imports over exports was 80,000,000 yen, but it fell off 6,000,000 yen for 1916. In other words, the exports for 1916 rose 70 millions and the imports lost 5 millions, causing the excess of imports over exports to decrease to 73 millions. In view of this, the expansion and encouragement of the chemical industry in Japan are as necessary as before. For 1913 the excess of imports over exports in Japan's foreign trade was 96,000,000 yen, of which the excess of chemical imports over exports was 79,000,000 yen, forming the larger portion of the unfavorable balance of our foreign trade. For 1916 the excess of exports over imports in our foreign trade was 371,000,000 yen, while that of chemical imports over exports was 6,000,000 yen. This reveals that the progress and development of Japan's chemical industry is not so appreciable as is supposed by some people. For chemicals have not contributed anything towards the favorable balance of our foreign trade, which recently stood at 400,000,000 yen, but have diminished it, although the domestic trade tends to our advantage, as the excess of imports over exports is falling off greatly. What effects then will the termination of the war work on our chemical industry?

Different views are held here as to prospects after the war. One is that the effect will be slight, and that even if it should be great, the industries once created can be maintained, while another opinion is that the effects will be so serious that the chemical industries will be given a severe blow. It is not easy to state positively which of these views is correct. For my part I am inclined to support the latter view. Naturally, the end of the war will prove as disadvantageous for us as its outbreak was beneficial. It cannot be said that all trade will be reduced to pre-war conditions upon its termination, for those which would have naturally developed without any beneficial war effect will survive. But those which have been brought forward particularly through the war, cannot but be considered as vanishing nearly entirely with the removal of that particular reason. In order to maintain in a more or less effective way the industry that has particularly benefited by the war, however, the whole nation must strive. After the war, Japanese chemical manufacturers will have to struggle in the foreign and Japanese markets against foreign competitors whose products are good and cheap, while they will have to suffer from keen competition among themselves. It is quite evident that on the occasion of this domestic rivalry the superior will finally win. What then distinguishes the superiority and inferiority of the rivals? In the first place it is the amount of capital commanded by them, and in the second the ability possessed by the directorate. When these conditions are equal, the spirit of

enterprise will decide. It is to be highly desired, therefore, that our chemical manufacturers combine at the present moment so as to compete with the foreign manufacturers and also that they will extend the market themselves and not through traders as hitherto.

In order to gauge the fate of Japan's chemical industry after the war, the products imported or exported in 1916, particularly those increasing or decreasing as compared with 1913 (before the war) may be mentioned. Of the exports, peppermint and chemicals fell off 500,000 yen each, but the rest were not particularly changed, except specific kinds, which rose greatly. The balance shows a gain. These specific kinds and their increased export for the year were as follows (in 1,000 yen):

	Exports	Exports
Matches	9,300	Earthen & Porcelain Ware
Glass	7,100	Paper
Camphor	4,000	Rapeseed Oil
Beer	1,970	Cement
Fertilizers	3,600	Grains
Rubber Tires (new export)	4,000	Explosives
		(new export)

These make a total of 56,670,000 yen, and as this amount takes up the larger part of the total increase of 68,135,000 yen, a study of these particular kinds may make it evident whether they can be exported as much as now after the war. In my opinion their exportation was by the specific reason of the war, and will be very hard to continue after the war.

Among the imports, those which increased or decreased particularly, are given below:

	Imports	Imports
Decreasing:	Yen	Yen
Sugar	23,900	Kerosene Oil
Paper	1,400	Aniline Dyes
Artificial Indigo	3,300	Plate Glass
Flour	1,900	Total
Increasing:		38,200
Pulp	4,500	Crude Soda
Paraffin Wax	1,900	Nitrate
Crude Caustic Soda	1,600	Soda Ash
Tannic Wood	3,600	Explosives
Aluminum	1,800	Carbolic Acid
		Total
		22,430

As the decrease of imports is also attributable to the specific reason of the war, it is evident that they will not increase continually after the war.

### The War's Creations in Industry

Let us now mention the principal kinds of the chemical industries newly created and extended since 1913, and look into their possible fate after the war.

**Cement.**—Since the war, this industry has developed markedly. In 1915 the manufacturers numbered 20, their yearly output being 4,090,000 casks, valued at 12,060,000 yen. The domestic demand being already satisfied entirely, the exports were 650,000 yen for 1913, and for 1916 they swelled to 2,710,000 yen. The existing prominent cement manufacturers are Asano, Aichi, Iwaki, Saga, Sudzuki, Tosa, and Sakura. Before the war the industry was dull, and it improved rapidly upon its outbreak. So it will become less prosperous with its termination. Measures must be taken from now on for preventing this possibility by studying the way of producing cheaper artificial stones and of employing them for laying roads, and other construction. In Germany houses are built finely and cheaply by the laying of artificial stone over coarse brick.

**Brick and Tile.**—This industry has also been "made" by the war, and it will be unavoidably affected by the return of peace. It is thought most important to reduce the cost of production by employing mechanical instead of hand power. In 1915 the brick factories in Japan numbered 581, their yearly output amounting to 5,420,000 yen.

**Plate Glass.**—Before the war the production of such glassware as cups, lamps, bottles, table utensils, flower vases, etc., was successful in Japan, and many of them were exported yearly. But plate glass was imported greatly, as it was very hard to produce it, the imports reaching 2,700,000 yen for 1914. Upon the outbreak of the war, however, the Asahi Glass Company of the Mitsu Bishi House, succeeded in producing plate glass, and as its products were supplied largely, the imports fell off to 1,650,000 yen for 1916, and some even were exported. After the war rivalry will be keen with the good and cheap Belgian and other foreign products. But it is reassuring to have in Japan such a big manufacturer behind the new industry.

**Electrolytic (Caustic) Soda.**—Needless to say that the soda industry is of great importance in the chemical industry. It has made a steady development since the war coincident with the progress of the chemical industry. For 1913, the domestic production of soda was only 9,530,000 lbs. valued at 460,000 yen, but for 1915 it increased to 16,080,000 lbs. valued at 1,000,000 yen. As to the importation of crude caustic soda, the value was 1,310,000 yen for 1913, and it rose to 2,930,000 yen for 1916. Of course, the figures include the soda made by other than the electro process. The leading manufacturers are the Osaka Soda Company of Kyushu, the Tokai Soda Company of Nagoya, the Asahi Electric Chemical Industrial Company of Tokyo, the Japan Electric Chemical Industrial Company of Matsumoto, and the Hodogaya Soda Company of Hodogaya, near Yokohama. After the war the fine and cheap foreign goods will certainly compete with the Japanese products. For self-preservation, it may be timely to raise the import duties, as every foreign country is doing. What is more urgently necessary is the lowering of the price of salt. For the utilization of electricity for soda making, it is thought best to study means for minimizing the waste of electricity and for increasing the employment of chlorine and hydrogen by-products.

**Potassium Chlorate.**—Since the war, many producers of this article have come into being. For 1915 its output was 4,160,000 lbs. valued at 2,550,000 yen, and it was expected that when the factories under construction were completed, the domestic demand would be more than satisfied entirely. This is now being practically seen. The largest manufacturers are the Japan Chemical Industrial Company, of Tokyo, the Arashiyama Electric Railway Company, of Kyoto, and the Japan Electric Chemical Industrial Company, of Tokyo. After the war, the small works will find themselves unable to stand, and their combination is most desirable, but this is unfortunately not hopeful now. It is thought vitally important for manufacturers to make their products the cheapest possible, while the import duties should be raised.

**Oil and Fat Industries (Paint and Glycerine).**—The production of animal and vegetable oils developed greatly in Japan previous to the war, and no anxiety need be held of its future. On the other hand, apprehensions are held as to the solid oil industry,

which has progressed particularly since the war. At the same time the manufacture of glycerine, a by-product, has also made much development. Still its importation amounted to 660,000 yen for 1916. Before the war glycerine was made on a very small scale by the use of waste soap liquors, and it began to be manufactured systematically only upon the outbreak of the war. Afterwards it will compete with the foreign products as much as other chemical goods, and although the Japan Glycerine Company with the subsidy of the Government, and other manufacturers founded very strongly may survive, the rest will be handicapped. To meet the situation, it is considered most important to combine the small manufacturers and to study fresh uses for the article. As to paints, the common qualities are sufficiently produced in this country, although the best goods have still to be imported. For 1913 the imports were 510,000 yen, but for 1916 they were only 53,000 yen. The demand has improved since the war.

**Kerosene Oil.**—The kerosene oil industry has made very marked progress in this country of late years. Until four or five years ago the demand was met in the proportion of 60 per cent imported and of 40 per cent domestic. But the proportions are now reversed. Consequently, the imports of lamp oil fell off to 8,000,000 yen for 1915, as against 11-15,000,000 yen since 1904. Since the war, the manufacture of lubricating oils has developed greatly, but it will be ill affected by the end of the war, and it is evidently necessary to improve manufacturing methods.

**Acetic Acid.**—Before the war much was imported from abroad, but since then, the industry has made great headway. For 1915

the domestic products were 4,280,000 lbs. valued at 1,230,000 yen, with which the domestic demand was satisfied. For 1916 the imports were only 1,000 yen, while the exports were 1,100,000 yen. After the war the industry will be badly affected, and it is thought important to study the utilization of the by-products more extensively so as to minimize waste.

**Dyestuffs.**—The dyestuff industry was created suddenly upon the outbreak of the war. Before this dyes were imported yearly to the value of over 10,000,000 yen. For 1913 the import value was 11,000,000 yen. The figure fell off afterwards, but for 1916 it again reached 7,000,000 yen, including paints and pigments. Twenty or thirty kinds of dyes can now be produced in Japan. After the war some of the kinds, as kryogene dyes (of which the Japanese products are mostly black) and four or five others, may compete with the foreign products and survive, but it is doubtful whether the rest will succeed. As to the manufacturers, the Japan Dyestuff Company subsidized by the Government, and the Miike Dye Works of the Mitsui House may maintain work after the war, but as to the remaining small capitalized concerns, much anxiety is felt as to their post-bellum fortunes.

**Foreign Paper Making.**—This industry had developed fairly well before the war, and with 1914 it grew suddenly active. For 1913 the output was 23,000,000 yen in value, but it increased to 29 millions for 1915. On the other hand, the imports of foreign paper were 2 millions for 1914, and for 1916 they rose a little, to 2,100,000 yen, while exports gained from 700,000 yen for 1914 to 5,800,000 yen for 1916. Pulp was got nearly entirely from

abroad before the war, but a few pulp manufacturers having come into being since then, the demand is now satisfied with the domestic products. After the war, keen competition will be created with the foreign manufacturers, and the domestic manufacturers, who are still but little experienced in the industry, must be prepared.

**Sugar Refining.**—Sugar is now produced in Japan so much as to meet the demand entirely. For 1915 the yield was 125,900,000 kin. Imports were 543,800,000 kin valued at 36,770,000 yen for 1913, but they fell off to 162,000,000 kin valued at 12,900,000 yen for 1916, while exports fluctuated from 168,800,000 kin valued at 15,800,000 yen for 1913 to slightly less quantity but valued at 16,400,000 yen for 1916. After the war competition will arise with the German and other foreign manufacturers, affecting the industry in a measure. It is gratifying to note, however, that Japan has many strongly founded sugar manufacturing companies.

**Beer Brewing.**—Before the war beer was sufficiently produced to meet the home demand, and upon its outbreak the industry grew in prosperity. For 1913 the exports were only 770,000 yen in value, but for 1916 they swelled to 2,740,000 yen. After the war no foreign competition need be feared in Japan, but the Japanese manufacturers will have to compete with rivals in such newly cultivated markets as China and Southern Pacific Islands. It is thought important for them to improve their product as much as possible and to supply it at the lowest possible price so as to maintain the new foreign markets after the war.—Translated for the Far East from *Jitsugyo-no Nippon*.

## The Philippine Railway Company

### Report of Operations in the Philippine Islands for the Year Ended December 31, 1916

In the report of the Philippine Railway Company for 1916 as submitted to the Directors, operating revenues show an increase of 4.4 per cent over the year 1915, the improvement being earned entirely on the Island of Cebu, where revenues increased 14.9 per cent. On Panay there was a decrease of 1.7 per cent.

The ratio of operating expenses to operating revenues for the past three years is shown below:

Year	Panay	Cebu	All Divs.
1914	60.23	71.28	64.44
1915	60.18	78.79	67.06
1916	65.70	64.40	65.17

The Commercial Shop Work performed during the past two years is as follows:

Cost of Completed Shop	1915	1916
Work	... \$38,860.17	\$33,258.14
Profit	... 9,019.77	12,411.50
Per cent of Profit	... 23%	37%

The greater percentage of profit on work done in 1916, as compared with 1915, is due to the increased value of material on hand and purchased a year or two ago as compared with present prices.

The cost of all materials and supplies in the Philippine Islands has increased enormously within the past two years. In addition to the high prices prevailing at the place of production, we have to pay the excessive transportation charges. The largest single item of our expenditure for supplies is for the purchase of fuel, which has amounted in past years to about 20% of the total operating expense. Our last contract for coal was at \$5.25 per ton, delivered alongside ship, duty paid, Iloilo and Cebu. Bids just received are at \$14.50

per ton. We still have on hand and under contract at old prices sufficient coal to last several months, and by the use of wood we expect to make out until the middle of next year, when we trust prices will have declined. The supply of wood adjacent to the railway is limited, and in the course of one or two years will be so far exhausted as to be worth considerably more than at the present time. We find that approximately \$7.50 worth of wood at existing prices will do the work of one ton of coal.

There have been several bills introduced in the Philippine Assembly to give governmental assistance to the development of the coal resources of the islands, and there seems reason to believe that some kind of legislation for this purpose will be enacted during the present session. We had on hand at the beginning of last year a fair stock of miscellaneous stores and supplies purchased at old prices, which, with our comparatively reasonable expenditure for fuel, has resulted in an increase in operating expenses of only 1.4% as compared with the year 1915.

#### Maintenance of Way and Structures

There was an increase of about \$4,000 in total maintenance of way cost as compared with 1915. This increase is due principally to the larger number of tie renewals. Up to the year 1912 there were practically no renewals made. The following table shows the renewals from 1912 to 1916, inclusive:

Year	Panay	Cebu	Total	Renewals per 1,000 ties in track
1912	2,285	1,730	4,075	10
1913	3,529	2,361	5,890	14

1914	4,794	3,180	7,974	20
1915	5,934	8,596	14,530	36
1916	7,346	13,703	21,049	52

Due to the prolonged rainy seasons of the past two years there have been a number of embankment failures on Panay, causing at times train delays of several hours. In locations where the embankment can be drained, the tendency to slide has been overcome, but we still have considerable trouble in the low rice lands. On Cebu there have been a number of small washouts, causing in some cases delays of several hours, but occasioning no large outlay for repairs.

It was found necessary during the year to renew with concrete the wood piles of the three-span approach trestle to the Talisay bridge on Cebu, and to construct a permanent bridge consisting of two twenty foot "I" beam spans on concrete piles at Kilometer 8.5 of the Panay Division. An extensive washout occurred at the latter point at the time of the typhoon of October, 1912, and a temporary relief trestle was then built. The new bridge is charged to additions and betterments.

The best woods we can obtain do not make very satisfactory piles. The trestles on Panay built on hard wood and creosoted pine piles are found to require more renewals than could have been anticipated. Wherever possible without great expense, renewals are made with concrete piles.

During the past year two thirty ton flats were converted into boxes, and two seven ton boxes were converted to flats. Two combination baggage and third-class cars and thirty-one freight cars were either rebuilt or received heavy repairs. Nine locomotives received heavy repairs during the year. The

total cost of maintenance of equipment was about \$3,500 less than for the year 1915. During the coming year six locomotives will require overhauling and about thirty-six cars of all classes will be rebuilt or receive heavy repairs. One ten ton wooden lighter was retired as unfit for further service and not worth repairing. This lighter will not be replaced. In 1917 it will be necessary to retire a sixty ton lighter. We expect to receive authority to charge the cost of a new one to additions and betterments.

### Transportation Expenses

The cost of transportation increased about \$6,000, or 6.4%, as compared with the year 1915. Of this increase, \$5,000 represents fuel, and is accounted for largely by the increased cost per ton of coal on pile, the use of wood to some extent as fuel, and a small increase in total tonne kilometerage.

The cost and consumption of fuel by locomotives as compared with 1915 is as follows:

	1916	1915
Total value of coal on tank ... ... ... ...	\$45,683.16	\$40,771.91
Total locomotive coal consumption (kgms.)	7,818,323	7,589,971
Coal consumption per locomotive kilometer (kgms.) ... ... ...	15.36	15.10
Coal consumption per 100 tonne kilometers (kgms.) ... ... ...	10.39	10.15

A statement showing in detail the charges to additions and betterments is attached hereto. The principal items are a relief for the Cebu power house constructed in our shops, and the erection of a concrete pile and steel girder at Kilometer 8.5 of the Panay Division.

Freight traffic shows an increase of less than one per cent as compared with the year 1915. Weather conditions on Panay were not favorable to agriculture. The rice crop of 1915-16 was a failure, and this alone accounts for a 20% decrease in revenue from transportation of farm products. On Cebu there was an increase in freight shipments which largely offset the loss on Panay. Passenger traffic on Panay was practically the same as for the previous year. On Cebu there was an increase of 8% due mostly to "fiesta" travel.

With the exception of a few isolated parcels, decrees have been given favorable to the company covering all right of way on the Island of Panay, and the registered titles have been executed for all except ten kilometers. On Cebu there is still about four kilometers of line which has not been decreed to us. This case, as well as the issue of all titles, should be concluded during the present year.

The interest on the outstanding 4% first mortgage bonds of the company amounted for the year to \$342,000.00—of this amount, the company was able to provide from earnings \$139,097.68, and the Philippine Government, in accordance with the contract of guaranty, advanced the balance, or \$202,902.32. The total advances made by the Government as of December 31, 1916, to meet the interest on the bonds is \$2,175,453.04.

# Chemical Industrial Co.

The Teikoku Kagaku Kogyo Kaisha (Imperial Chemical Industrial Company) has been organized with a capital of Y.600,000. The promoters are Messrs. Kakutaro Yamagishi, Yasushi Watanabe, Kisaburo Okura, and others. All the shares were bought by the promoters and endorsers. Baron Rempei Kondo, an endorser, undertakes 3,000 shares. The company will engage in manufacturing dyestuffs and drugs from special materials in Fukushima prefecture.

# Philippine Railway Company's Accounts

## Cost of Road, Equipment, and General Expenditures

Cost of Road as of December 31, 1915	...	...	...	...	...	...	...	...	...	\$6,052,529.39
Add for:										
Additions and Betterments During Year:										
Right of Way	...	...	...	...	...	...	\$ 644.09			
Rails	...	...	...	...	...	...	20.10			
Other Material	...	...	...	...	...	...	105.03			
Bridges, etc.	...	...	...	...	...	...	1,128.88			
Machinery	...	...	...	...	...	...	991.74	\$2,889.84		
Less Value of Road Retired:										
Land for Transportation Purposes	...	...	...	...	...	\$ 199.17				
Grading	...	...	...	...	...	491.80				
Roadway Machines	...	...	...	...	...	975.00	1,665.97			1,223.87
Cost of Road as per Balance Sheet	...	...	...	...	...					\$6,053,753.80
Cost of Equipment as of December 31, 1915	...	...	...	...	...					\$510,996.53
Less Value of Equipment Retired:										
Floating Equipment	...	...	...	...	...	...	...	...	...	500.00
Cost of Equipment as per Balance Sheet	...	...	...	...	...	...	...	...	...	\$510,496.53
<b>General Expenditures</b>										
General Expenditures as of December 31, 1915	...	...	...	...	...	...	...	...	...	\$2,586,266.98
Less Interest During Construction	...	...	...	...	...	...	...	...	...	309.03
General Expenditures as per Balance Sheet	...	...	...	...	...	...	...	...	...	\$2,585,957.95
<b>Balance Sheet Assets</b>										
Property Investment:										
Road	...	...	...	...	...	...	...	\$6,053,753.80		
Equipment	...	...	...	...	...	...	...	510,496.53		
General Expenditures	...	...	...	...	...	...	...	2,585,957.95	\$9,150,208.28	
Contractual Rights (Cost)	...	...	...	...	...	...	...			4,999,000.00
Working Assets:										
Cash, Securities, Accounts Receivable, and Supplies	...	...	...	...	...	...	...			230,744.51
Deferred Debits	...	...	...	...	...	...	...			2,670.83
Corporate Deficit:										
Profit and Loss—Balance	...	...	...	...	...	...	...	\$1,489,473.69		
Less Total Appropriated Surplus	...	...	...	...	...	...	...	113,765.66		1,375,708.03
										\$15,758,331.65
<b>Liabilities</b>										
Capital Stock—Common	...	...	...	...	...	...	...	...	...	\$5,000,000.00
Funded Debt: First Mortgage Four per cent. Thirty-year (Due 1937) Sinking Fund Gold Bonds	...	...	...	...	...	...	...	...	...	8,549,000.00
Working Liabilities: Audited Vouchers, Wages Unpaid, etc.	...	...	...	...	...	...	...	...	...	33,878.61
Deferred Credit: Advances by Philippine Government to Meet Bond Interest	...	...	...	...	...	...	...	...	...	2,175,453.04
Appropriated Surplus:										
Additions to Property Through Income	...	...	...	...	...	...	...	\$38,765.66		
Reserve for Extraordinary Emergencies	...	...	...	...	...	...	...	75,000.00		
								113,765.66		\$15,758,331.65
<b>Revenue and Expenses</b>										
<b>REVENUE</b>										
							1916	1915		Increase or Decrease Per Cent
Passenger	...	...	...	...	...	...	\$233,016.72	\$219,015.42		6.39
Freight	...	...	...	...	...	...	115,536.83	110,177.89		55*
Excess Baggage	...	...	...	...	...	...	816.22	734.40		11.14
Mail	...	...	...	...	...	...	5,439.25	5,439.24		—
Express	...	...	...	...	...	...	5,389.36	5,263.56		2.39
Switching	...	...	...	...	...	...	4,394.13	3,534.25		24.33
Special Service Train	...	...	...	...	...	...	123.28	—		100.00
Non-Transportation	...	...	...	...	...	...	13,590.65	12,242.72		11.01
Total Revenue	...	...	...	...	...	...	\$378,306.44	\$362,407.48		4.38
<b>EXPENSES</b>										
Maintenance of Way and Structure	...	...	...	...	...	...	\$ 62,792.21	\$ 58,834.65		6.72
Maintenance of Equipment	...	...	...	...	...	...	45,091.49	48,603.27		7.22*
Traffic	...	...	...	...	...	...	4,311.60	4,271.89		.93
Transportation	...	...	...	...	...	...	106,486.29	100,102.68		6.38
General	...	...	...	...	...	...	27,867.99	31,223.00		10.74*
Total Expenses	...	...	...	...	...	...	\$246,549.58	\$243,035.49		1.44
Net Operating Revenue	...	...	...	...	...	...	\$131,756.86	\$119,371.90		10.37
Operating Ratio	...	...	...	...	...	...	65.17%	67.06%		2.82*
Kms. Operated	...	...	...	...	...	...	212	212		

\*Decrease.  
Panay Division—116.40 Kms.  
Cebu Division—95.60 Kms.

## Traffic Statistics

PASSENGER		1916	1915	Increase or Decrease Per Cent
Total Number Carried	...	1,321,795	1,203,325	9.84
First Class	...	2,019	2,339	13.68*
Second Class	...	176,627	167,936	5.17
Third Class	...	1,143,149	1,033,050	10.66
Number Carried One Kilometer	...	29,366,886	27,600,941	6.40
Average Distance Carried per Km.	...	22.2	22.9	3.06*
Average Receipt per Passenger	...	\$.1763	\$.1820	3.13*
Average Receipt per Passenger per Km.	...	\$.0079	\$.0080	1.25*

FREIGHT				
Total Number Tonnes Carried	...	86,895	82,328	5.55
Number Tonnes Carried One Km.	...	3,337,782	3,499,663	4.62*
Average Distance Carried per Km.	...	38.4	42.5	9.65*
Average Receipt per Tonne	...	\$.13296	\$.14111	5.77*
Average Receipt per Tonne per Km.	...	\$.0346	\$.0332	4.21

\*Decrease.

## PIPE THAT WILL NOT BREAK

The first of the accompanying pictures represents, not a section of rubber tubing or a piece of textile fabric, but a piece of steel pipe that has been subjected to the shock of some forty gallons of nitroglycerin exploded in an oil well. Only a few years ago the best steel pipe then obtainable would have been shattered to fragments by such an experience, but modern pipe is eminently "punishable"—as the slang of the industry puts it. The case just mentioned is not at all unusual, we are told by a writer in Railway and Locomotive Engineering (New York, October). A volume might be filled, he says, with similar ones, all going to show the great advance that has been made in the production of material of this kind. We read:

"Among the striking improvements in the manufacture of metals in recent years there are none more remarkable than the advance that has been made in material for pipe. A few years ago it would be impossible to obtain pipe that would withstand the unusual strains involved in present-day service. Some of these unusual experiences would scarcely be believed if they were not verified by a 'cloud of witnesses.' These incidents, while in a sense they may be unusual, are valuable as showing the progress made in metallurgical science, and are of interest to all who are interested in the improvement of mechanical appliances.

"A volume might be made of these experiences, all showing the inherent qualities or 'punishability' of pipe, the result for the most part of unusual accidents. Indeed it would be impossible to duplicate the circumstances under which many of these unlooked-for tests occurred.

"In our various illustrations Fig. 1 shows a piece of  $5\frac{3}{8}$ -inch steel casing that was originally about 18 feet long, and was stuck in an oil well. About 170 quarts of nitroglycerin had been placed in the well and was suddenly shot off with the idea of blowing this piece out, and at the same time 'shooting' the well. Instead of shooting it out, however, the casing was reduced in length from 18 feet to approximately 6 feet. It was drawn to the surface after great difficulty and was found to be crushed, twisted, and distorted, but no fracture was shown.

"The incident reproduced in Fig. 2 occurred when a string of 340 feet of 10-inch oil-well casing fell 236 feet when an elevator let go. The picture shows what happened to the lower length of pipe when the casing hit the bottom of the well. The thread protector was forced over the threads and up over the pipe approximately 12 or 13 inches and the pipe was bent backward and inward. As will be noted, however, the material shows no fracture. This happened in the Oklahoma oil field.

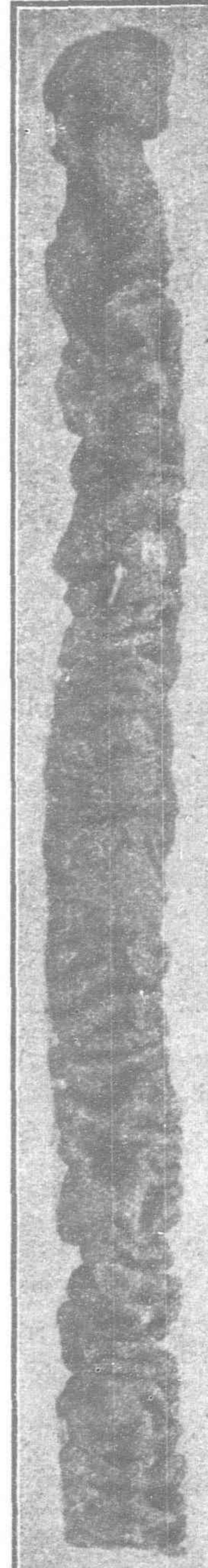


FIG. 1.—A PIPE THAT CRUMPLED, BUT WOULD NOT BREAK, WHEN FORTY GALLONS OF NITROGLYCERIN EXPLODED

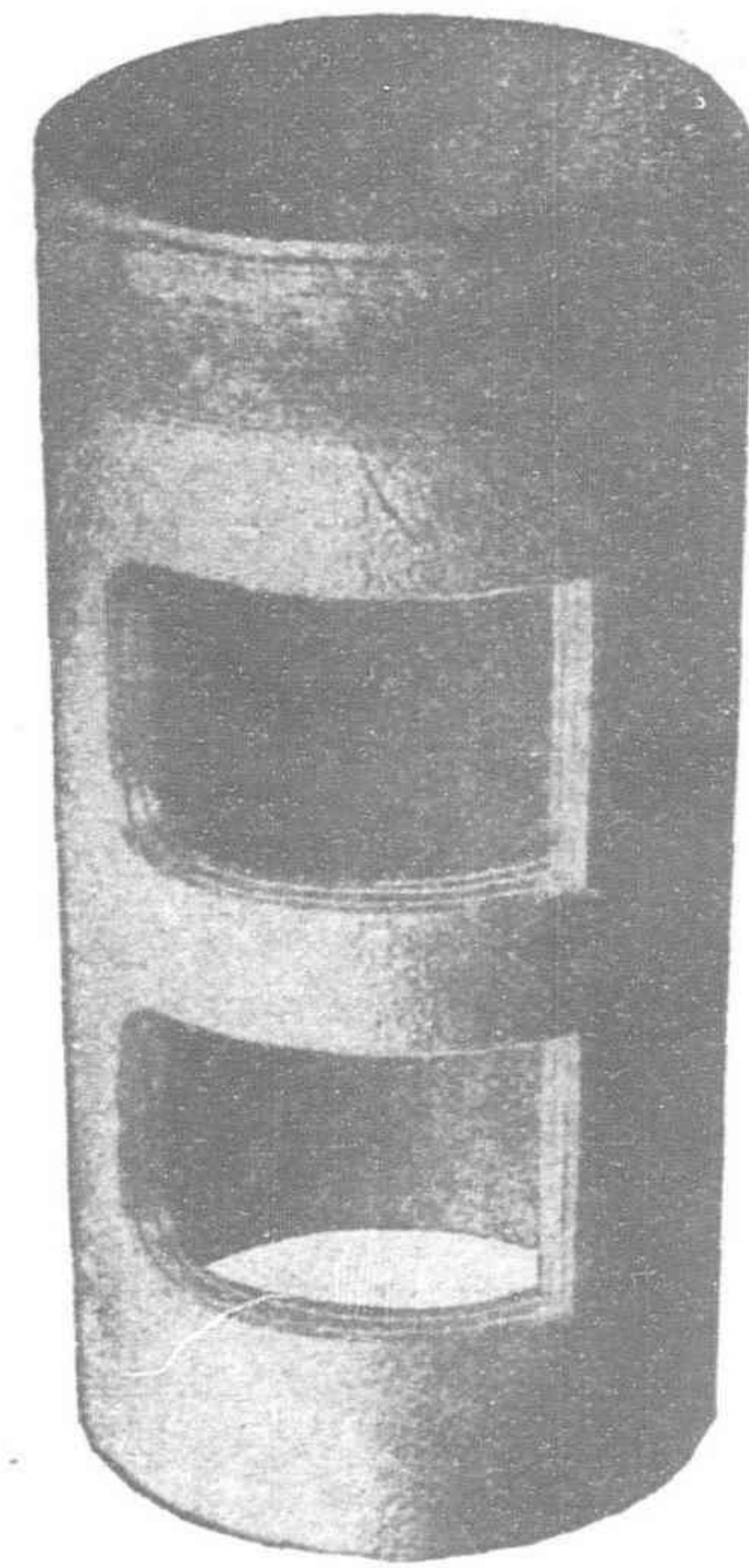


FIG. 2.—THE END OF A HEAVY PIPE THAT FELL 236 FEET WITHOUT BREAKING

"Fig. 3 shows '3 in 1' section of casing. There was a string 1,440 feet long of  $8\frac{1}{2}$ -inch steel casing; the elevator let go and the string of pipe, weighing something over 34,000 pounds, dropped 200 feet to a bottom of limestone. The three sections on the bottom were telescoped—one inside and one outside. It will be seen that there was no failure in the weld, and the three lengths telescoped without a crack. The exterior apparently shows a straight length of casing. The particular piece here given was machined to show the three separate sections as telescoped.

"The circumstances are substantially the same as those in Fig. 2, but the results are very different. This incident occurred in the Ohio field, and such experiences might be multiplied from numerous sources as well as from files of the research department of the National Tube Company."

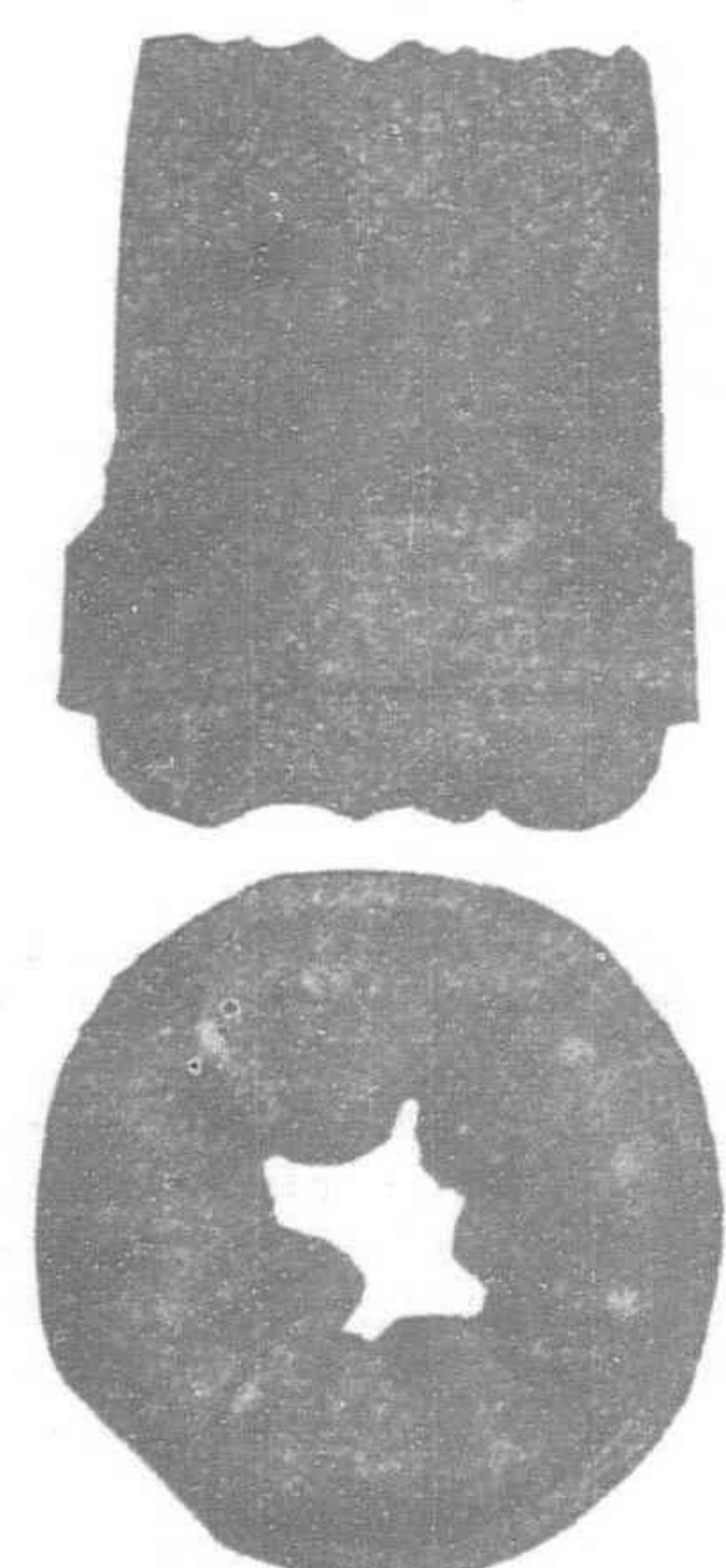


FIG. 3.—THE THREE SECTIONS OF THIS CASING TELESCOPED WITHOUT CRACKING WHEN 34,000 POUNDS OF PIPE FELL 200 FEET

# ENGINEERING, FINANCIAL, AND INDUSTRIAL NEWS

## RAILWAYS

**The Shih-Chen Loan.**—The agreement for a further loan of Y.2,600,000 from the Yokohama Specie Bank for the construction of the Shihpingchien-Chenchiatun Line was formally signed by Mr. Tsao Ju-lin, Minister of Communications and the agent of the Yokohama Specie Bank recently and the following are the important points:

1. Amount: Y.2,600,000.
2. Interest: seven per cent per annum.
3. Term of loan: one year.
4. Security: the Shih-Chen Line.

**Chinese Railway Profits.**—Profits made on the railway and telegraphic service in China for the year 1917 were \$13,500,000 and \$3,800,000, respectively, while the loss of the postal service for the same period was \$110,000, according to the report submitted by the Ministry of Communications to the President and Cabinet. This leaves a net profit of \$17,190,000 to the Government.

**Through Traffic in Shantung.**—It has been agreed that the negotiations for through traffic between the Shantung Railway and the Tientsin-Pukow Railway, which were discontinued last summer, shall be resumed.

Mr. Senshu (Traffic Manager of the Shantung Railway) visited Tientsin and Peking towards the end of last December to discuss the detailed regulations of the through traffic with Director Hsu. The detailed regulations, which formed the subject of consideration between the representatives of the two railways, were amended according to the Chinese proposals and were signed only recently, ready to be presented to the Communications Office, Peking, for sanction.

It is expected that the through traffic will be inaugurated soon.

**Fifty Ton Electric Locomotives.**—The 50 ton electric locomotives for use by the Fushun Collieries for freight handling are the first of their kind built at the South Manchuria Railway Workshops. They are for the standard gauge.

The locomotive is designed to have the tractive force of hauling 580 ton trains at the speed of 12.9 miles per hour on the level tangent track, exclusive of the weight of the locomotive, the trolley voltage being 1,200 volts D.C.

The maximum instantaneous tractive effort for starting purpose will be 28,400 lbs., with a current of 266 amperes per motor, assuming 25 per cent coefficient of adhesion.

The locomotive is of the two bogie type, each bogie carrying 125 H.P. motors. It is equipped with two current collectors of the roller pantograph and multiple unit controller.

The chief dimensions of the locomotive are as follow:

### WEIGHT

Total weight	97,200 lbs.
Ballast weight	15,200 "
Weight on drivers	112,400 "
Weight per driving axle	28,100 "
Weight of a motor (about)	5,000 "

### WHEEL BASE

Total wheel base	20 ft. 9 in.
Rigid wheel base	5, 3 "

### MOTORS

No. and size of motors	4-125 H.P.
Trolley voltage	1,200 volts D.C.

### WHEELS

No. of driving wheels	8
Diameter of driving wheels	40 in.

### AXLES

Diameter between wheels	6 $\frac{3}{4}$ in.
at motor suspension	6 $\frac{3}{4}$ "
at gear	6 $\frac{3}{4}$ "
at journal	4 $\frac{9}{16}$ in.

### GEAR RATIO

Gear Ratio	1 : 5.53
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### CAB

Type, Steel sloped	
Length over cab	29 ft. 4 in.
Height over cab from top of rail	11 "
Length between knuckle faces	36 "
Width over all	9, 8 "

### Takutang (Kiangsi) Model Settlement.

To the left of the Kiukiang railway station at Takutang, says the *North-China Daily News* correspondent, some enterprising business men are reclaiming a large tract of land. This is our in embryo model Shanghai. The scheme has been thought of for many years, and Chang Mo-chi and other leaders have done much to encourage it. The plan is to recover a stretch of inundated country and build thereon a model settlement. The work of filling in is going on at present and will be practically finished before the summer water rises. More than 1,000 men are employed daily in this enterprising scheme. Several temporary bridges have been erected over the creek; over these light railways have been constructed, which convey mud and earth from different directions. An immense bank of earth in front of John L. Duff's farm is being removed; mud is also being carted from the bed of the lake. When the whole is filled in, banked and leveled, the idea is to divide it into lots among the present investors. The streets are to be straight, the houses uniform, and the whole settlement laid out in the latest style. Immediately behind this new city will be Kiukiang's summer lake.

**Chinese Eastern Railway.**—The Bolshevik Commissioner of Communications has, says the *North-China Daily News* Correspondent at Harbin, telegraphed to General Horvath immediately to proceed to Petrograd and report on railway matters, which are now placed under the Ministry of Communications instead of that of Finance. General Horvath replied that it was impossible to leave Harbin, owing to the presence of the newly appointed Chinese President of the railway.

Mr. Kuo Tsung-chi has published a notification to the railway employees announcing that he has assumed the position of President on the instructions of the Chinese Minister of Communications. He will make the round of the various departments the heads of which will be presented to him. It is expected that, after becoming familiar with the working and methods of the railway, he will return to Kirin.

### SHIPPING

**Japanese Ship Subsidies.**—The Japanese Government's shipbuilding bounties for the new fiscal year are put at Y.4,636,725 for forty-five vessels, with 209,000 tons, 131,000 H.P., showing a decrease of Y.1,894,505 from the preceding fiscal year.

**Salvage of Kasuga.**—According to a recent report to Tokyo, the Japanese cruiser Kasuga which was stranded on an island of the Dutch East Indies stands fair chances of being refloated.

A salvage crew consisting of an engineer and 120 hands was dispatched from the Kure Naval Dockyard to the scene.

**The Kawasaki Output.**—Since last year, the Kawasaki Dockyard Company has constructed seventeen stock boats of over 9,000 tons and under 12,000 tons, of which one was

**Russian Railway Troubles.**—M. Wentzel, Director of the Chinese Eastern Railway, telegraphs from Petrograd to General Horvath the impossibility of executing railway indents, owing to all the railway's capital being in the hands of the Ministry of Finance, which the Bolsheviks have commandeered.

**Bridge Collapses on Kin-Han.**—The most serious accident that has yet occurred on the Peking-Hankow Railway since it was built happened recently through the breaking of a bridge near Hwayuan beyond Siaokan in Hupeh province, says *C. C. Post*. A train of trucks was going north packed with soldiers who had run away from the recent fighting and were homeward bound. The bridge broke beneath the weight of the engine, which fell down a considerable height on the river bed—at present practically dry—and the trucks came down on top of it. They caught fire and the whole train was burned. The soldiers who escaped unhurt promptly ran for their lives in all directions and few of them have been seen since. Very little could be done in the way of rescue, and there were few there who knew how to set about it. The result was the loss of a train with about seventy lives, as far as is known, and a very considerable number of injured, some of whom have been brought back here.

sold to America, twelve to England, three to the Osaka Shosen Kaisha, and the remaining one to the Kishimoto S.S. Co.

At present the yard has six 9,000 ton class vessels under construction, which are expected to be launched by June.

The company has the construction of over fifty stock boats on the tapis to meet the demand of the mercantile marine in the future.

The United States embargo on the export of iron, however, has seriously affected the execution of the above scheme, and the company may be compelled to cut down the number of vessels on the program by a few. The construction of stock boats after the completion of the six vessels will be kept on

#### Nippon Yusen Kaisha American Line.—

The fact that the Nippon Yusen Kaisha has transferred a superior class of ships from the European line to the American line is already known to the interested circles. The company, as is the case with the Osaka Shosen and Toyo Kisen, has been placed under the Government subsidy for next year. For this purpose the company is to employ the 12,000 ton ships, Fushimi Maru and Suwa Maru, and is applying to the authorities for permission to that effect. As ordinary liners, the company is to employ the Katori and Kashima, both 10,000 tons, and the Kamo and Atsuta, both 8,000 tons. Compared with the seven ships of 6,000 tons each formerly maintained on the line, the new schedule of ships shows an increase of bottoms by 20,000 tons, and the passenger accommodations, which were limited to 200 salons and 80 steerage, will be increased to 450 salons and 220 steerage passengers.

Of these ships, ships of 10,000 tons have been run so far only to Shanghai and Hongkong, but the new program will extend their course to these ports and Manila, and the two 8,000 tons ships will run to and from Kobe, Yokohama, Victoria, and Seattle. Besides that, these six ships are the best class of the company's fleet and will negotiate the crossing of the Pacific in twelve days instead of sixteen to seventeen days formerly required. The whole program, then, means a great improvement over existing conditions.

**Daiun Maru Chartered.**—The Daiun Maru No. 10 (2,600 tons) of the Hayashi Steamship Company has been chartered by the Yokohama Minami Taiheiyo Boeki Company at thirty-two yen per ton.

**Another Port Arthur Salvage.**—About fourteen years ago a Norwegian steamer, which was sunk at that port during the bombardment of Port Arthur by the Japanese, is now being refloated. *Shipping and Engineering* says that the work is undertaken by the Osaka Iron Works and that the work of refloating this steamer will be finished by the end of the year. The owners had, for several years after the Russo-Japanese War, been negotiating with the Russian Government about getting payment for the loss of this steamer and eventually the Russian Government paid full compensation.

**The Peking Refloated.**—Some six months ago the Swedish East Asiatic Company's steamer Peking, on a homeward trip from the East, got on fire in the Suez Canal and capsized. The ship was left lying on her side with several feet of water over all. The Svitzer Salvage Company, Copenhagen, whose salvage steamer Protector has for some years past been stationed in the vicinity of the place where the accident happened, contracted with the insurance companies for salvage. The terms agreed to, says *Engineering*, were that the salvage company was to have fifty per cent of the cargo and ship. The cargo, consisting of 6,000 tons of

copra, was discharged by removing plates from the ship's side and dried on shore, realizing on sale some £111,000. After being thus lightened the hull was again made good, and the salvage proper commenced. Within a month the boat had been conveyed to water deep enough to allow of her being righted. She was then pumped dry and taken to Suez, where the necessary repairs can be undertaken, after which the Peking will probably be worth some £360,000, so that the Svitzer Company may expect to receive upwards of £220,000.

**Nippon Yusen Kaisha Steamers on Indian Lines.**—The Nippon Yusen Kaisha is running, in addition to its regular liners, the following special steamers leaving Kobe on the Indian lines, in order to relieve the congestion of goods at the harbor, consisting chiefly of matches, cloth, glassware and notions; the Jinsen Maru, the Ayaba Maru, the Tenryu Maru, the Colombo Maru, the Ceylon Maru, and the Hakuan Maru.

**No Trace of Hitachi.**—The result of the search made by the Allied navy, the Imperial navy, and the Nippon Yusen Kaisha steamer Chikuzen Maru for the missing Nippon Yusen Kaisha liner Hitachi Maru has proved futile, and there is no certain trace of her having been destroyed by the enemy during her voyage between Colombo and the South African coast or of her having been wrecked on account of storm or other natural disaster. Such is the résumé of the statement announced by the Department of Communications.

**America Will Halve Oriental Shipping.**—According to a recent report from Washington, Chairman Hurley of the Shipping Board has presented to President Wilson a shipping program to solve the question of the troop transportation, which includes a reduction of the imports from the Orient and South America to one half the present amount.

The War Board is deciding the restricted class of imports and has also proposed to put at the disposal of the affected importers a number of sailing vessels and neutral crafts.

**Another Line Gone.**—It is officially reported that the Messageries Maritimes Line has stopped its Far Eastern service owing to the wholesale requisitioning of shipping by the French Government, with the result that Lyons is troubled by a famine of raw silk. French weavers are now requesting the Paris Government to restore the Messageries Maritimes Oriental service.

**Seamen Want Insurance.**—The union of foreign merchant marine officers at Shanghai, according to a dispatch dated January 24, has recently demanded of the Shanghai Steam Navigation Company that the latter pay damages of \$50,000 taxes for the loss of a life, in view of the dangers of navigation in China. The seamen belonging to the union insist that they will not go aboard any Chinese steamer if their demands are not complied with.

**Japan's Merchant Marine.**—At the end of October the number of persons in Japan owning vessels of a thousand tons or above was 126. The total number of vessels was 458, aggregating 1,467,498 tons.

**First Wooden Ship in the East.**—The first of the new wooden vessels, built in America for the shipping emergency, to reach Japan was the three-masted steamer Rosewood, 1,350 tons, which arrived at Yokohama Feb-

ruary 7, nearly a two-months voyage from Seattle via San Francisco and Honolulu.

The ship sailed December 8, but encountered rough weather, and having used all her coal, put in at Yokohama for fuel. She arrived at Shanghai with her cargo of 2,000 tons of lumber and miscellaneous goods, after taking coal.

**S. S. Dairen Maru.**—The locally registered steamer Dairen Maru, 2,600 tons gross, owned by the Kishimoto Kisen Kaisha, Dairen, has been relieved of her cargo service between the Orient and America by the Robert Dollar S.S. Co., by which she was trip-chartered last December, and has been newly chartered for one year by the South Pacific Trading Co., Kobe, at the rate of Y. 32 per ton per month.

**Hakushin Maru.**—The Dairen K. K cargo boat Hakushin Maru, which has been under Mitsui Bussan Kaisha charter since last year, will have the term of her charter party with the firm terminated at the end of this month and has been arranged to ply irregularly between Dairen and Shanghai as cargo carrier from next month on her own account.

**Nawa Maru Sunk.**—The Osaka Shosen Kaisha s.s. Nawa Maru, 966 tons, while on a return voyage from Okinawa, foundered in the offing of Saganoseki in the Bungo Channel on the morning of January 29.

Thirty-three of the crew are missing.

**Singapore Freights.**—Homeward freights to Liverpool and London, except for tin, have been increased 100 per cent.

**Imam Sold.**—The Philippine Department steamer Imam has been sold to the Basilan Lumber Company which will use the steamer principally to carry lumber from the mills at Isabela de Basilan to Cebu.

**Hospital Ship Busuanga.**—The splendidly equipped hospital ship Busuanga arrived at Zamboanga from Manila recently and is now on the job. The ship will make its headquarters at Zamboanga and Jolo, spending fifteen days of each month in the vicinity of each port. The Busuanga, a former coast guard cutter, was refitted as a hospital ship and its expenses are being paid jointly by the Rockefeller Foundation and the Philippine Government. The cost of refitting was P.115,000 of which the Foundation paid P.50,000 and the Philippine Government P.65,000. The Foundation contributes P.25,000 annually toward its maintenance.

The old steam engines of the Busuanga have been replaced by a 320 horse power Bolinder burning crude oil and is economical.

**Freights Unification Question.**—The crockery dealers of Nagoya proposed to the Communications Office and the N. Y. K., the O. S. K., and the T. K. K., to unify the freight for general cargo at G. \$25 per ton for shipment to the United States. The question is now under investigation at the hands of the above companies under orders of the Government.

The exporters of general goods at that city and those of Yokohama, Osaka, and Kobe started an antagonistic movement on the ground that even the rate on tea stood at G. \$18, and the proposed adoption of G. \$25 for uniform rate was unbearably heavy.

## FINANCE

**Bank of China in 1917.**—For the year ending December 31, 1917, the Bank of China made a profit of \$2,240,000. From this was deducted the following amounts on the various accounts given below:

Reserve fund	\$230,000
Special reserve	450,000
Dividend on Gov. Shares	600,000
Dividend of 12 per cent on shares held by public	440,000
Bonus to employees	380,000
Accounts to be settled	100,000

This leaves a balance of about \$200,000 to be carried to the account of 1917.

**Gold Standard in Manchuria.**—With regard to the popularizing of the gold standard in South Manchuria attended with the proposed adoption of the gold standard by the Exchanges under Government management, the Dairen Staple Produce Exchange is said to be pursuing investigations about the effects of the introduction of the change.

Some people think that the adoption of the gold standard for the Exchanges will take place in the near future.

**Japanese Dividends.**—The average rate of dividends of banks still stands at 10.20 per cent per annum, says the monthly report issued by the Hypothec Bank of Japan yesterday, but that of companies is now as high as 22.34 per cent per annum. Thus the grand average comes up to 19.14 per cent per annum. This last figure is the highest ever attained during the last twelve months. It is also much above the highest since 1912.

However, the grand average yield of securities has come down from 7.53 per cent per annum of the preceding month to 7.37 per cent per annum. This decrease has apparently been brought about largely by the decline in yields of bank shares, for the average yield of bank shares stands 4.59 per cent per annum, as against 4.77 per cent per annum of the preceding month, while the average for company shares now stands at 8.36 per cent per annum against 8.52 per cent per annum of the preceding month.

The cause for this decline in net yields while the dividend rates are up is to be found principally in the fact that the prices on the Tokyo Stock Exchange have been up. The grand average price is now Y.167.93 against Y.155.98 of the preceding month and Y.160.25 of the same time last year.

Following is a list of principal shares and their yields:

Shares	Prices Feb. 1.	Dividends	Yields
	Y.	%	%
Bank of Japan	797.00	12.00	3.00
Do new	637.00	12.00	0.94
Specie Bank	276.00	12.00	4.34
Do new	217.00	12.00	2.76
Nippon Yusen Co.	362.00	50.00	6.90
T.K.K.	148.50	35.00	11.78
O.S.K.	196.00	50.00	12.75
Tokyo Gas	58.00	9.00	7.75
Tokyo Electric Light	70.30	10.00	7.11
Kanegafuchi Cotton	255.00	50.00	9.80
Fuji Cotton	152.00	35.00	11.51
Nippon Oil	140.00	25.00	8.92
Hoden Oil	116.50	20.00	8.58
Taiwan Sugar	115.00	26.00	11.30
Kuhara Mining	129.00	35.00	13.56
Oji Paper	158.50	22.00	6.95
Japan Brewery	144.00	25.00	8.68
Tokyo Stock Exchange	195.00	18.00	4.61
new	156.00	18.00	1.44

## TRADE AND COMMERCE

**Manchuria Produce at Dairen.**—The arrival of Manchurian produce at the Dairen Wharves during November was 108,602 tons beans, 82,153.3 tons bean cake (including 78,980.4 tons of local outputs), 3,213.2 tons bean oil, 10,240 tons kaoliang, and 2,431.5 tons maize. The aggregate, inclusive of other cereals, etc., reached 149,917.7 tons by train and 73,324.3 tons by carts. Compared with the corresponding month last year, Beans showed a decrease by 23,976.6 tons, bean cake by 15,215.5 tons, and others by 16,439.9 tons.

**Export from Annam.**—The local director of customs at Tourane Indo-China has furnished the following information concerning the principal exports of his district, including central and southern Annam, during the year 1916. The figures given below are stated in metric tons and United States currency. Previous figures by weight for this port are not immediately available, but a comparison by value is given with customs statistics of previous years.

Articles	1914	1915	1916	Tons
Cinnamon	\$381,588	\$472,586	\$752,813	388
Sugar	153,587	247,708	467,385	7,728
Tea	153,236	289,073	313,823	815
Hides	122,002	98,529	92,362	191
Rice and paddy	277,033	117,032	63,345	2,307
Fish	37,818	31,572	54,284	115

About 3 per cent of the foreign trade of French Indo-China passes through the Tourane customs district. This district occupies an anomalous position in French Indo-China. It is the only region where rice does not form, either directly or indirectly, by far the leading article of export, and not one of the three leading exports of this district figures prominently in the list of exports of any other part of French Indo-China.

Both the customs value and the market value of exports from Annam reached record figures in 1916; but there is no part of French Indo-China in which European trade is at a lower ebb. There is a large colony of Chinese merchants at Faifo, near Tourane, and the trade in cinnamon, sugar, and fish is almost entirely in their hands. European trade is represented by tea, silk, maize, hides, and albumen.

**Japan's Trade with China.**—The value of exports from Japan to China during the first half of 1917 amounted to Y.130,596,000, the figures showing an increase of Y.53,305,000 as compared with the corresponding period of last year. Imports to Japan from China during the six months under review, amounted to Y.44,329,000, showing a decrease of Y.56,000 over the corresponding period of last year. The following table shows the value of exports and imports during the first half of the present year together with those during the corresponding period of last year:

	1917	1916
Manchuria	Y.20,893,000	Y.7,429,000
North China	43,203,000	27,553,000
Central China	65,826,000	42,024,000
South China	674,000	285,000

	1917	1916
Manchuria	Y.6,588,000	Y.4,543,000
North China	13,920,000	14,580,000
Central China	21,036,000	21,186,000
South China	2,785,000	4,076,000

**Rice Crop of Japan.**—The Department of Agriculture and Commerce states that the rice crop of this year will be above the average. According to the reports of conditions received by the department up to August 15, this year's

crop will be about seven per cent above the average, estimated at 55,758,236 koku, while the average crop is 52,110,492 koku, one koku being equal to 4.96 bushels. In certain quarters it is believed that there will be a record harvest this year, and consequently the quotations are about Y.3.40 lower than the highest figure reached in July, namely Y.24.72 per bale.

The following statistics concerning certain lines of Japanese agriculture during 1915 and 1916 have been obtained from official sources, as estimates:

**Rice.**—1915, total of 279,622,950 bushels; 1916, total of 291,508,400 bushels; average crop during past 7 years, 260,552,460 bushels; largest crop during past 10 years (in 1914), 285,032,705 bushels. The exports of rice during 1916 were the largest since 1899, and were principally to meet demands from Great Britain.

**Tea.**—1915, total of 84,196,076 pounds; 1916, total of 93,457,640 pounds.

**Barley.**—1916, total of 47,796,210 bushels.

**Wheat.**—1916, total of 29,348,055 bushels.

**Japanese Sugar Company for Java.**—All preparations to establish the new Southern Pacific Sugar Manufacturing Co., promoted by Mr. Senkichi Hayakawa and more than 100 leading business men in Tokyo, are now completed, says the *Japan Advertiser*. At a recent meeting it was decided to fix the capital of the new concern Y.6,000,000 (\$2,988,000), divided into 120,000 shares, 100,000 of which will be taken up by the promoters, while 20,000 will be offered for public subscription. The principal object of the new company is to purchase several sugar plantations that have hitherto been operated by Dutch capitalists in Java, and that the new concern works in concert with the Dutch colonial government in Java, which will render aid to Japanese enterprises.

**Sugar Production in Formosa.**—According to the report of the Taiwan Sugar Manufacturers Association, the total forecast output for the present year is 6,817,947 piculs of which 3,528,731 piculs will be for domestic consumption, while the remainder will be for foreign export. The output of the different plantations is estimated as follows:

Companies	Total Output	Exp. Am't.
Taiwan	1,636,384	792,790
Ensuiko	952,063	461,252
Meiki	897,083	434,615
Toyo	1,044,450	506,011
Dainihon	693,960	336,207
Niitaka	505,827	245,062
Teikoku	610,734	295,887
Rinhogen	288,695	139,866
Niiko	98,710	47,822
Tainan	61,310	29,704
Taito	28,731	—
Total	6,817,947	3,289,216

## ELECTRICITY

**Japanese Electric Goods for Makers Combine China Trade.**—About a year ago the Japanese authorities tried to promote an understanding between large Japanese manufacturers of electric apparatus and general goods with the object of furthering the export of these articles to China by preventing fratricidal competition between them. It is now reported that Furukawa, Fujikura, and Sumitomo firms, and the Yokohama Electric Wire Company, which have hitherto competed strenuously in export to China, have reached an agreement to sell on a joint basis. Their largest foreign rivals in China are American manufacturers.

**Japanese Electrical Enterprises.**—The number of electrical enterprises organized in October was 670, with a total capital of Y.680,681,899, of which those engaged in the supply of current numbered 579, with an aggregate capital of Y.323,969,149; those engaged in the electric transit business were 43, with a capital of Y.48,877,969; those in both lines of enterprises were 48, with a total capital of Y.308,834,781. Compared to the corresponding period of the preceding year, the increase was 46, with a capital of Y.23,344,737. Further, the number which received license of establishment was 7, with a total capacity of 2,035 kilowatts and a capital of Y.60,025,000. Two started work during November with a capacity of 56 kilowatts and a capital of Y.227,000. Eight new licenses granted were for the construction of power houses, having a capacity of 4,053 kilowatts, while those which have been completed have a capacity of 1,469 kilowatts.

**Osaka Company Increases Capital.**—The Osaka Electric Light Company has decided to increase its capital from Y.21,600,000 to Y.40,000,000. The reasons for the proposal are the establishment of more generating stations in view of the increased demand for electric motive-power, the purchase of a collier, the laying of underground lines, and other general improvement of the service.

**More Hydroelectric Works in Japan.**—The Electricity Bureau announces that during October the bureau granted charters to the number of 14 for the use of water courses to generate power. If the official sanctions thus granted are fully made use of, 22,235 horse power of electric power will be generated.

## LUMBER

**Yalu Timber Returns.**—Up to November 20, the timber rafts received at Antung by the Chinese dealers outside the Yalu Timber Co. totaled 4,977 rafts comprising 1,728,000 pieces of timber. Of this number the Yalu Timber Co. bought 76 rafts comprising 23,790 pieces.

**South Manchuria Timber Co.**—There is a scheme on foot say Manchuria advices, to found a South Manchuria Timber Co. capitalized at Y.310,000, with the head office at Antung. Its chief business will be to act as broker in the supply of railway sleepers, mine timber, etc. Mr. K. Ishimoto (Mayor of Dairen) is said to be slated for president.

**Siam Stops Teak Exports.**—It is reported that the Siamese Government has prohibited the export of teak timber. The shipment of this timber which is much required for shipbuilding can only be made upon licenses from the Government.

## SUGAR

**Japan Plans Sugar Monopoly.**—According to the Japanese press, a monopoly of the manufacture of sugar by the Government is planned as one of the many measures devised to increase or stabilize revenue, and it probably will form one of the most important official measures for discussion in the Japanese Diet in the coming session.

The monopoly plan has been persistently reported in business circles and is now thought to be a practical question. One of the Govern-

ment parties in the Diet, the Kokuminto, will study its advisability. Evidently the Government plans to take for itself the big profits that Taiwan sugar mills now enjoy, and thus finance its big naval and military schemes more steadily than ever.

The nature of the present plan of monopoly is said by the leaders of the sugar trade to be for the Government to buy up all sugar mills within Japan's territories and sell their products, just as the Government did when it nationalized tobacco factories. This will increase the Government revenue but it will require more than Y.200,000,000.

**Taiwan (Formosa) Sugar Outlook.**—According to a prominent sugar manufacturer and dealer in Japan the estimates of the sugar output in Taiwan are rather pessimistic and range between 6,100,000 piculs and 6,500,000 piculs. In his opinion the most accurate estimate is 6,300,000 piculs, which is a decrease of 500,000 piculs from the previous season when the output was 6,800,000 piculs.

**Java Sugar Men Suffer from War.**—The war is no longer a blessing to Java sugar men, for they cannot sell their products as freely as before; the war situation having called away tonnage from Java's shores. They threaten to dump now and their attitude is regarded with apprehension by Japanese manufacturers. In November, the Java sugar market began to experience the present difficulty and the standard grade was then quoted at 8.75 guilders. The price on December 20 was 8.50 guilders, or more than 2 guilders below the normal.

Japanese sugar manufacturers fear that the war-stricken Java manufacturers may start dumping in Hongkong and Japan. Even now the low quotation from that source proves a check to the consultation among manufacturers here as to disposition of new sugar.

Refiners maintain that they will not buy Taiwan crude goods but will buy from Java. Thus the Japanese market is brought to a standstill although the greatest buying season is on.

**U. S. to Buy Java Sugar.**—According to a Reuter's dispatch the United States Food Controller, Mr. Hoover, states that the American sugar supply in 1918 must be augmented by 250,000 tons from Java.

**Japanese Fear Hongkong Sugar Competition.**—Hitherto Japanese sugar manufacturers have refrained from exporting Formosan crude sugar to Hongkong, fearing competition between Japanese refined sugar and its Hongkong rival in China. The export of Formosan crude sugar has been chiefly to Canada, Australia, and India. This year it will be difficult to make usual export to Canada owing to the scarcity of tonnage. If no special arrangements are made, about a million piculs will have to be exported to Hongkong. This is a serious matter for Japanese sugar manufacturers and merchants, for the freight for crude sugar between Formosa and Japan proper being Y.1.50 per picul as against only 50 sen for shipment from Formosa to Hongkong, Japanese exporters of refined sugar to China would have to lower prices by one yen to meet their Hongkong rivals. The sugar companies are trying hard to restrict export to Hongkong. It has so far been suggested that about one half of the quantity which would otherwise have to be exported to Hongkong should be dumped in Canada, but it is doubtful whether such a suggestion will be seriously considered.

**Japan Sugar Co. Declares 20 Per Cent Dividends.**—The Japan Sugar Manufacturing Company held an ordinary general meeting of shareholders yesterday afternoon to receive the report of the Board of Directors on the

business result for the past six months. The net profit was Y.2,184,294 and was, together with the balance of Y.909,779 brought over, available for distribution. President Fujiyama recommended dividends of 20 per cent per annum and received the hearty approval of shareholders.

**No Fear for Philippine Sugar.**—There is no cause for alarm that exports of Philippine sugar to Japan will be curtailed as the result of the Japanese Government's plan to create a Government sugar monopoly, according to Harold M. Pitt, president of the Manila Merchants' Association. In a recent statement Mr. Pitt explained that the Japanese imported only the lower grades of Philippine sugar. The amount purchased depends upon the sugar crop in Formosa, the principal source of Japanese home supply. In the event of a poor crop in Formosa, there is heavier buying from the Philippines. The amount of sugar exported to Japan varies from one to four million pesos annually. Philippine exports to Japan are small as compared with the total sugar business of the islands, which ranges from P.25,000,000 to P.40,000,000 annually. China takes practically the same grades of sugar as Japan, and local dealers would have no trouble in disposing of the amount which Japan may not take.

## INDUSTRIAL

**Japanese Rivet Company Formed.**—A new company has been floated for the manufacture of nuts and rivets with a capital of Y.600,000. It is controlled by Baron Hanichi Akamatsu as president and Mr. Kaku Takino as managing director.

**Japan's Soda-Ash Trade.**—The demand for soda-ash in Japan has greatly increased with the development of the glass industry. Before the war British soda-ash (57-58 per cent) was quoted at Y.2.50 or Y.2.69 per 100 lbs., but the present quotations are Y.14.50 for the British product, and about Y.12 for the American. Owing to this heavy advance, glassware manufacturers are in serious difficulties, with the exception of the Asahi Glass Company and one or two other companies, which supply their own needs. The following table shows imports during recent years:

		Kin	Value
1914	...	54,935,327	Y.1,550,479
1915	...	51,070,808	1,403,091
1916	...	64,013,597	3,698,440
1917 (Up to Sept.)	...	51,779,740	4,565,131
Sept., 1917	...	10,844,482	1,182,163

The development of the glass industry in this country is handicapped in that it depends chiefly on imported material. The manufacturers interested have accordingly been making arrangements for increasing the domestic output of soda-ash.

**S. Manchuria Railway's Ammonia for Export.**—Sulphate of ammonia from the factory of the S. M. R. Co. is mostly intended for export to the South Seas. The present annual output is about 20,000 tons worth Y.6,000,000-Y.7,000,000. In course of time, the yearly output is to be increased to 100,000 tons. The Japanese Government recently prohibited the export of sulphate of ammonia abroad from Japan, and it appears that the Government is said to be thinking of applying the embargo to Manchuria also. In the event of this extension of embargo taking effect, it would check the export, and the railway company is reported to have requested that the Japanese Government keep Manchuria outside the sphere of operation of the embargo.